

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
Focus Goals Levels 9 - 12

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 science is a process that demands the review of ideas or models in the context of experimental evidence.
- 1.2 Design and conduct an experimental investigation.

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 Objectively present the findings of an experimental investigation.
- 2.2 Communicate an understanding of the scientific principles related to the findings obtained in the investigation.

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 Know that the value and quality of knowledge acquired through science is dependent on the demanding peer review process.
- 3.2 Discuss significant positive and negative effects that are the direct result of the process and products of scientific investigation.
- 3.3 Explore the careers available to those participating in lifelong scientific inquiry.
- 3.4 Apply Literacy skills to make scientific connections.

THE NATURE OF SCIENCE
Levels 9 - 12

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 science is a process that demands the review of ideas or models in the context of experimental evidence. (p)

- Recognize that ideas supported by evidence are maintained while ideas not supported by evidence are rejected. (p)
- Distinguish between hypothesis and theory as scientific terms. (cIE-1f)
- Recognize the use and limitations of models and theories as scientific representations of reality. (cIE-1g)
- Recognize the issues of statistical variability and the need for controlled tests. (cIE-1j)
- Identify and communicate sources of unavoidable experimental error. (cIE-1b)
- Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions. (cIE-1c)
- Recognize the cumulative nature of scientific evidence. (cIE-1k)
- Recognize that when an observation does not agree with an accepted scientific theory, sometimes the observation is mistaken or fraudulent (e.g., Piltdown Man fossil or unidentified flying objects), and sometimes the theory is wrong (e.g., Ptolemaic Model of the movement of the sun, moon and planets) (cIE-1n)

1.2 Design and conduct an experimental investigation. (p)

- Select and use appropriate tools and technologies (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect, data, analyze relationships, and display data. (c/IE1a)
- Solve scientific problems using quadratic equations, and simple trigonometric, exponential, and logarithmic functions. (c/IE1e)
- Analyze situations and solve problems that require combining and applying concepts from more than one area of science. (c/IE11)

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 Objectively present the findings of an experimental investigation. (p)

- Write a laboratory report detailing the methods, materials, data and analysis of an experimental investigation.

2.2 Communicate an understanding of the scientific principles related to the findings obtained in the investigation. (p)

- Use experimental findings to support or reject related scientific principles (given the quantity and quality of the collected data). (p)
- Formulate explanations using logic and evidence. (c/IE1d)
- Investigate a science-based societal issue by researching the literature, analyzing data, and communication the findings. Examples include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water decisions in California. (c/IE1m)

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 Know that the value and quality of knowledge acquired through science is dependent on the demanding peer review process. (p)

- Review scientific investigations prepared by other students or published in scientific literature.

3.2 Discuss significant positive and negative effects that are the direct result of the process and products of scientific investigation. (p)

- Identify technological innovations that have had large scale effects on society and history.

3.3 Explore the careers available to those participating in lifelong scientific inquiry. (p)

- Discuss connections between academic science content and career opportunities.

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

- Apply knowledge of word meaning and draw inferences to learn scientific terminology through reading. (R-1.0)
- Read to analyze and evaluate scientific informational materials and be able to defend and clarify interpretations. (R-2.0)
- Write reflective compositions on a scientific topic. (W-2.0)
- Deliver multi-media presentations on scientific topics under study. (L/S-3.0)