

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.

FOCUS ON EARTH SCIENCE

Level 6

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.

1.0 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.

Focus Goals

- 2.1 Identify and understand major geologic events and how they reshape the Earth.
- 2.2 Analyze the evidence of plate tectonics.
- 2.3 Understand and explain how dynamic systems shape the landscape (topography).
- 2.4 Understand and describe how natural forces and human interactions change the Earth.
- 2.5 Understand how to classify renewable and nonrenewable energy resources.
- 2.6 Understand and explain energy flows in Earth systems.
- 2.7 Understand and describe the factors that affect weather.

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.

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2.1 Identify and understand major geologic events and how they reshape the Earth.

- θ Explain that earthquakes or sudden motions along breaks in the crust called faults, and volcanoes/fissures are locations where magma reaches the surface of the earth. (c1d/n)
- θ Describe how major earthquakes, volcanic eruptions, and mountain building result from plate motions. (c1e/n)
- θ Know how to determine the epicenter of an earthquake and that the effects of an earthquake vary with its size, distance from the epicenter, local geology, and type of construction involved. (c1g/n)

2.2 Analyze the evidence of plate tectonics.

- θ Recognize the fit of the continents, location of earthquakes, volcanoes, mid-ocean ridges, and the distribution of fossils, rock types, and ancient climatic zones provide evidence for plate tectonics. (c1a)
- θ Identify the layers of the Earth as a cold, brittle lithosphere; hot convecting mantle, and dense metallic core. (c1c/b)
- θ Know that lithospheric plates the size of continents and oceans, move at rates of centimeters per year in response to movements in the mantle. (c1c/n)
- θ Explain and identify major features of California geology in terms of plate tectonics (including mountains, faults, and volcanoes). (c1f)

2.3 Understand and explain how dynamic systems shape the landscape (topography).

- θ Recognize how downhill running water is the dominant process in shaping the landscape, including the landscape of California. (c2a)
- θ Know that rivers and streams can erode and transport sediment, change course and flood their banks in natural and recurring patterns. (c2b)
- θ Explain how beaches get sand from rivers which moved along the coast by wave action. (c2c)

2.4 Understand and describe how natural forces and human interactions change the Earth.

- θ Identify how earthquakes, volcanic eruptions, landslides, and floods change human and wildlife habitats. (c2d)

2.5 Understand how to classify renewable and nonrenewable energy resources.

- θ Determine the factors involved in converting an energy source to other usable forms and the consequences of the conversion process. (c6a)
- θ Identify different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and classify them as renewable or nonrenewable. (c6b)
- θ Determine the natural origin of materials used to make common objects. (c6c)

2.6 Understand and explain energy flows in Earth systems.

- θ Know that the sun is the major source of energy powering winds, ocean currents, and the water cycle. (c4a)
- θ Determine how solar energy reaches the Earth through radiation, mostly in the form of visible light. (c4b)
- θ Explain how heat from the interior of the Earth reaches the surface primarily through convection. (c4c)

2.7 Understand and describe the factors that affect weather.

- θ Recognize how differences in pressure, heat, air movement, and humidity result in changes of weather. (c4e)

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.

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LIFE SCIENCE
Level 6

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

Focus Goals

- 1.1 Understand how energy and matter are transferred from one organism to others.
- 1.2 Understand that organisms can be categorized by the functions they serve.
- 1.3 Recognize the factors that impact 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.

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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.

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1.1 Understand how energy and matter are transferred from one organism to others.

- θ Explain how energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis, and then from organism to organism in food webs. (c5a)
- θ Recognize that over time, matter is transferred from one organism to others in the food web, and between organisms and the physical environment. (c5b)

1.2 Understand that organisms can be categorized by the functions they serve.

- θ Categorize organisms on the basis of the functions they serve in an ecosystem. (c5c)
- θ Demonstrate how different kinds of organisms play similar ecological roles in similar biomes. (c5d)

1.3 Recognize the factors that impact ecosystems.

- θ Explain and support how organisms in an ecosystem depend on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. (c5e)

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Focus Goals

2.1 Understand the variety of ways that energy can be transferred.

2.2 Understand how heat is transferred by conduction, convection and radiation.

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.

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2.1 Understand the variety of ways that energy can be transferred.

θ Explain how energy can be carried from place to place by heat flow, waves, light and sound, or by moving objects. (c3a)

2.2 Understand how heat is transferred by conduction, convection and radiation.

θ Recognize that when fuel is consumed, most of the energy released becomes heat energy. (c3b)

θ Describe how heat flows in solids by conduction (which involves no flow of matter) and in fluids by conduction and convection (which involves flow of matter). (c3c)

θ Describe how heat energy is transferred between objects by radiation; radiation can travel through space. (c3d)

θ Explain how convection currents distribute heat in the atmosphere and oceans. (c4d/n)

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Focus Goals

1.1 Develop meaningful questions and conduct appropriate 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 scientific procedures and explanations.

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 and understand benefits and consequences of technological solutions.

3.2 Explore careers in science.

3.3 Apply Literacy skills to make scientific connections.

THE NATURE OF SCIENCE**Level 6**

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 Develop meaningful questions and conduct appropriate investigations.

- θ Develop a hypothesis. (c7a)
- θ Be aware of control and variable factors.
- θ Select and use appropriate tools and technology. (c7b)
- θ Recognize whether evidence is consistent with a proposed explanation. (c7e)
- θ Read a topographic map and a geologic map for evidence provided on the maps. (c7f)
- θ Interpret events by sequence and time from natural phenomena (e.g., relative ages of rocks and intrusions). (c7g)
- θ Identify changes in natural phenomena over time (e.g. a tree limb, a stream, and a hill slope). (c7h)

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 scientific procedures and explanations.

- θ Construct appropriate graphs from the data and develop qualitative statements about the relationships between variables. (c7c)
- θ Communicate the steps and results from an investigation. (c7d)
- θ Construct and interpret a simple scale map. (c7f)

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 and understand benefits and consequences of technological solutions. (n)

- θ Recognize and describe influences and specific contributions of science and technology to society.
- θ Determine limitations of science and technology on solving human problems.
- θ Identify many people from many cultures and their contributions to science.

3.2 Explore careers in science. (c)

- θ Understand and explain the classification of people in science and their work.
- θ Identify and describe a variety of settings in which scientists work.

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

- θ Learn and use science vocabulary encountered through reading informational text. (R-1.0)
- θ Read, comprehend, analyze, and evaluate scientific information. (R-2.0)
- θ Write scientific research and investigation reports. (W-2.0)
- θ Use technology and reference sources to locate and interpret information on science topics. (W-3.0)
- θ Deliver informative presentations on scientific topics and investigations. (L/S-2.0)