

**DoDEA
Science
Content Standards**

**Grades
PreK-12**

Pre-K – 12 Science Content Standards

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DoDEA Pre-K Science Standards

S1: Scientific Inquiry

The student begins to develop abilities necessary to do scientific inquiry and to explore through scientific inquiry; that is, the student:

S1a: asks questions about objects, organisms, and events in the immediate environment.

S1b: accesses information by asking questions.

S1c: conducts simple explorations through observation and active play.

S1d: uses simple equipment and tools to extend the senses.

S1e: uses observations to answer questions.

S1f: communicates explorations through speaking, drawing, and writing.

S2: History and Nature of Science

The student begins to develop an awareness of science as a human endeavor; that is, the student:

S2a: demonstrates curiosity during active play and explorations.

S2b: recognizes that in science it is possible to work alone or as a team.

S2c: recognizes how science and technology are used in their everyday lives.

S3: Science in Personal and Social Perspectives

The student begins to develop an awareness of safety and types of resources as it relates to the immediate environment; that is, the student:

S3a: demonstrates personal and group safety during active exploration and observation.

S3b: identifies resources in their immediate environment.

S3c: practices conservation of resources.

S4: Science and Technology

The student begins to develop an understanding about science and technology; that is, the student:

S4a: recognizes that tools and technology can be used to observe, measure, and make things.

S4b: identifies ways tools and technology are used at home and school.

S4c: recognizes that people are always inventing new tools and ways of doing things.

DoDEA Pre-K Science Standards

S5: Physical Science

The student begins to develop an understanding of matter, motion and energy; that is, the student:

S5a: identifies observable properties of objects and materials.

S5b: explores how objects move.

S5c: explores and identifies observable properties of light, heat, and magnets.

S6: Life Science

The student begins to develop an understanding of the characteristics of organisms, their life cycles, and their environments; that is, the student:

S6a: explores the differences between living and non-living things.

S6b: observes and describes change in personal growth and change in other living organisms.

S6c: develops sensitivity to the needs of living organisms in their environment.

S7: Earth and Space Sciences

The student begins to develop an understanding of Earth materials, objects in the sky, and changes in Earth and sky; that is, the student:

S7a: explores and identifies simple properties of soil and water.

S7b: observes changes in weather over time.

S7c: observes and identifies changes in the Earth and sky.

DoDEA Kindergarten Science Standards

S1: Scientific Inquiry

The student develops abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

S1a: asks questions about objects, organisms, and events in their environment.

S1b: accesses information from a variety of sources.

S1c: plans and conducts simple explorations through active play.

S1d: uses simple equipment and tools to gather data and extend the senses.

S1e: uses observations to construct reasonable explanations.

S1f: communicates scientific explorations and explanations through speaking, drawing and writing.

S2: History and Nature of Science

The student develops an awareness of science as a human endeavor; that is, the student:

S2a: demonstrates curiosity and initiative during active play and explorations.

S2b: recognizes that in science people work alone or as a team to share ideas and findings.

S2c: recognizes the use of science and technology in their everyday lives.

S3: Science in Personal and Social Perspectives

The student develops an understanding of safety and types of resources as it relates to their immediate environment; that is, the student:

S3a: demonstrates personal and group safety when engaged in science.

S3b: describes the various resources in their environment.

S3c: practices conservation of resources.

S4: Science and Technology

The student develops an understanding about science and technology, and the nature of technological design; that is, the student:

S4a: recognizes that tools and technology can be used to observe, measure, and construct things.

S4b: explains how tools and technology are used at home and school.

S4c: identifies ways that tools and technology are used to make our lives easier.

S5: Physical Science

The student develops an understanding of matter, motion, and energy; that is, the student:

S5a: classifies objects according to observable properties.

S5b: explores and explains how physical properties may affect the motion of objects.

S5c: describes observable properties of light, heat, and magnets.

DoDEA Kindergarten Science Standards

S6: Life Science

The student develops an understanding of the characteristics of organisms, their life cycles, and their environments; that is, the student:

S6a: observes the physical characteristics of plants and animals in their environment.

S6b: compares growth and change in living organisms.

S6c: develops respect, care, and sensitivity to the needs of living organisms in the environment.

S7: Earth and Space Sciences

The student develops an understanding of Earth materials, objects in the sky, and changes in Earth and sky; that is, the student:

S7a: identifies and describes simple properties of rock, soil, and water.

S7b: identifies and describes different types of weather.

S7c: identifies and describes features of objects in the sky (e.g., sun, moon, and stars).

DoDEA Grade 1 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

- S1a:** asks questions about objects, organisms, events and relationships in the environment.
- S1b:** accesses information from a variety of sources.
- S1c:** plans and conducts explorations and simple investigations.
- S1d:** uses simple equipment and tools to observe, gather, and record data.
- S1e:** uses observations and recorded data to construct reasonable explanations.
- S1f:** communicates scientific explorations, investigations and explanations through speaking, drawing, and writing.

S2: History and Nature of Science

The student demonstrates an understanding of science as a human endeavor; that is, the student:

- S2a:** demonstrates curiosity and initiative in thinking about and doing science.
- S2b:** works alone or as a team member when engaged in science, and shares ideas and explains scientific findings.
- S2c:** recognizes that people of all ages, backgrounds, and groups have made contributions to science and technology.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, types of resources, and changes in the environment; that is, the student:

- S3a:** demonstrates personal and group safety when engaged in science at school.
- S3b:** identifies and compares sources and quantities of resources.
- S3c:** practices conservation of resources.

S4: Science and Technology

The student demonstrates an understanding about science and technology and the nature of technological design; that is, the student:

- S4a:** explains how tools are designed to help people to extend their senses and solve problems.
- S4b:** uses tools to measure, construct, and test their own product/design.
- S4c:** explains how tools and technology are used to make our lives easier.

DoDEA Grade 1 Science Standards

S5: Physical Science

The student demonstrates an understanding of matter, motion, and energy; that is, the student:

S5a: recognizes that materials exist in different states.

S5b: demonstrates how pushing and pulling will change the movement of an object related to its speed, position, and direction.

S5c: explores light, heat, and magnetism as forms of energy.

S6: Life Science

The student demonstrates an understanding of the characteristics of organisms, their life cycles, and their environments; that is, the student:

S6a: identifies and describes the physical characteristics of plants and animals that live in their environments.

S6b: explores the life cycles of organisms.

S6c: identifies the physical characteristics an organism needs to adapt to changes in their environment.

S7: Earth and Space Sciences

The student demonstrates an understanding of Earth materials, objects in the sky, and changes in Earth and sky; that is, the student:

S7a: compares, classifies, and describes the properties of rocks, soil, and water.

S7b: describes factors that contribute to weather and its changes (e.g., temperature, wind, precipitation).

S7c: compares and explains changes in the Earth and sky.

DoDEA Grade 2 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

S1a: asks questions about objects, organisms, events, and relationships in the environment.

S1b: accesses and uses information from a variety of sources.

S1c: plans and conducts explorations and investigations.

S1d: employs equipment and tools to systematically gather and record data.

S1e: uses recorded data to construct reasonable explanations and make predictions.

S1f: communicates scientific explorations, investigations and explanations through speaking, drawing, and writing.

S2: History and Nature of Science

The student demonstrates an understanding of science as a human endeavor; that is, the student:

S2a: demonstrates curiosity, initiative, and persistence in thinking about and doing science.

S2b: works alone and together as a team member when engaged in science and communicates findings to others.

S2c: recognizes that people of all ages, backgrounds, and groups make contributions to science and technology.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, types of resources, and changes in the environment; that is, the student:

S3a: practices personal and group safety when engaged in science at school.

S3b: compares the needs of a population with the sources and quantities of resources.

S3c: practices conservation of resources.

S4: Science and Technology

The student demonstrates an understanding of science and technology and the nature of technological design; that is, the student:

S4a: knows that people use science and technology to answer questions and solve problems.

S4b: explains areas in which technology has impacted human lives.

S4c: explains that people are always inventing new tools and ways of doing things.

S5: Physical Science

The student demonstrates a conceptual understanding of matter, motion and energy; that is, the student:

S5a: compares and contrasts observable properties and changes in states of matter.

S5b: describes positions and motion of objects and explains relationships between motion and applied forces.

S5c: examines production of light and heat as forms of energy.

DoDEA Grade 2 Science Standards

S6: Life Science

The student demonstrates a conceptual understanding of the characteristics of organisms, their life cycles, and their environments; that is, the student:

S6a: describes and compares the basic needs of plants and animals in different environments.

S6b: explores the environmental factors that impact the life spans and life cycles of organisms.

S6c: identifies the needs/behaviors of organisms and suggests how organisms can adapt to their particular environment (e.g., fresh water, marine, forest, desert, grassland, etc.)

S7: Earth and Space Sciences

The student demonstrates a conceptual understanding of Earth materials, objects in the sky, and changes in Earth and sky; that is, the student:

S7a: compares and contrasts Earth's materials, atmospheric gases, and water, and explores their role as natural resources.

S7b: explains how changes in the Earth and the sky cause weather and seasonal changes.

S7c: identifies patterns of objects in the sky.

DoDEA Grade 3 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

- S1a:** asks questions about objects, organisms, events, and relationships in the environment.
- S1b:** accesses and uses information from a variety of sources.
- S1c:** plans and conducts explorations and investigations based on the nature of the question.
- S1d:** employs appropriate equipment and tools to systematically gather, record, and analyze data.
- S1e:** uses revised data to construct reasonable explanations and make predictions.
- S1f:** communicates investigations and explanations using scientific language and mathematics.

S2: History and Nature of Science

The student demonstrates an understanding of science as a human endeavor; and the history and nature of science; that is, the student:

- S2a:** demonstrates curiosity and persistence, and begins to use reasoning in thinking about and doing science.
- S2b:** knows that in science people work alone or as a team member to share and critique new information with others.
- S2c:** describes how careers in science have changed throughout history.
- S2d:** describes the variety of contributions made by men and women scientists of different cultures throughout history.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, types of resources, and changes in the environment; that is, the student:

- S3a:** practices personal and group safety when engaged in science.
- S3b:** compares the needs of a population with sources and changes in environmental resources.
- S3c:** practices conservation of resources.

S4: Science and Technology

The student demonstrates an understanding about science and technology, and the nature of technological design; that is, the student:

- S4a:** understands how tools, technology and inventions are designed to answer questions and help solve problems.
- S4b:** understands how tools, technology and inventions impact people and other living organisms.
- S4c:** recognizes that people are always inventing new tools, technology and inventions.

DoDEA Grade 3 Science Standards

S5: Physical Science

The student demonstrates a conceptual understanding of matter, motion, and energy; that is, the student:

S5a: sorts, classifies, and describes physical properties of objects and materials.

S5b: describes and measures the position and motion of objects relative to other objects, time, and distance.

S5c: explores electricity and sound as forms of energy.

S6: Life Science

The student demonstrates a conceptual understanding of the characteristics of organisms, their life cycles, and their environments; that is, the student:

S6a: classifies plants and animals in multiple ways according to their characteristics.

S6b: explores how organisms clearly resemble their parents.

S6c: describes how an organism's behavior is influenced by its environment.

S7: Earth and Space Sciences

The student demonstrates a conceptual understanding of Earth materials, objects in the sky, and changes in Earth and sky; that is, the student:

S7a: identifies and describes specific properties of minerals, soils, and fossils.

S7b: describes the formation and movement of clouds and their role in weather.

S7c: observes, records, and describes objects in the sky (e.g., sun, moon, constellations, etc.) in terms of characteristics, location, and movement.

DoDEA Grade 4 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

- S1a:** asks questions about objects, organisms, events, and relationships in the environment.
- S1b:** accesses, evaluates and uses information from a variety of sources.
- S1c:** plans, conducts and records simple investigations based upon the nature of the questions to be answered.
- S1d:** employs simple instruments such as rulers, magnifiers, and thermometers to systematically gather, record, analyze, and interpret data.
- S1e:** uses data to construct reasonable explanations and to make predictions.
- S1f:** reviews and asks questions about the reports and results of other scientists' work.
- S1g:** communicates findings and conclusions of investigations using scientific language and mathematics.

S2: History and Nature of Science

The student demonstrates an understanding of science as a human endeavor; and the history and nature of science; that is, the student:

- S2a:** recognizes that doing science requires varying human abilities, interest, and habits of mind (e.g., reasoning, insight, skill, creativity, flexibility, and skepticism).
- S2b:** demonstrates and models working alone or as a team member to share and critique new information.
- S2c:** explains developments throughout history that have impacted science as a career option.
- S2d:** explains how men and women in science have made contributions that impact the quality of life.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, types of resources, changes in environments, and science and technology in local challenges; that is, the student:

- S3a:** identifies the benefits and practices of appropriate personal safety, health, nutrition, and resource conservation.
- S3b:** identifies natural hazards in the environment.
- S3c:** recognizes that science and technology are used to identify ways to help solve social problems.

S4: Science and Technology

The student demonstrates an understanding about science and technology, and the nature of technological design; that is, the student:

- S4a:** recognizes and explains how specific tools, technology and inventions assist humans to work efficiently or live more conveniently.
- S4b:** explains how inventions and technology impact people and other living organisms.
- S4c:** explores/invents/designs possible solutions to an identified problem.

DoDEA Grade 4 Science Standards

S5: Physical Science

The student demonstrates a conceptual understanding of matter, motion, and energy; that is, the student:

S5a: compares and contrasts observable properties (i.e., size, weight, color) of matter, and the ability to react with other substances.

S5b: develops relationships between motion and applied forces.

S5c: contrasts electricity and magnetism as forms of energy.

S6: Life Science

The student demonstrates a conceptual understanding of organisms, and their environments; that is, the student:

S6a: distinguishes between plants and animals based on their structures and functions.

S6b: describes how the characteristics of organisms are inherited from their parents and developed from interactions with the environment.

S6c: develop simple food chains and food webs.

S7: Earth and Space Sciences

The student demonstrates a conceptual understanding of Earth materials, objects in the sky, and changes in Earth and sky; that is, the student:

S7a: examines fossils in relation to Earth materials.

S7b: demonstrates and describes how various types of weather impact materials on Earth.

S7c: compares and contrasts objects in the sky by describing motion, orbit, rotation, and gravitational forces of Earth, sun, and moon.

DoDEA Grade 5 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

- S1a:** develops questions about objects, organisms and phenomena that can be answered through scientific investigations.
- S1b:** accesses, evaluates and uses information from a variety of sources.
- S1c:** designs and conducts scientific investigations based upon the nature of the questions asked.
- S1d:** employs appropriate tools and techniques to systematically collect, record, analyze, interpret, and present data.
- S1e:** uses evidence from reliable sources to develop logical descriptions, predictions, explanations, and models.
- S1f:** asks questions about scientific knowledge.
- S1g:** communicates findings and conclusions of investigations using scientific language, writing, and mathematics.

S2: History and Nature of Science

The student demonstrates an understanding and appreciation of science as a human endeavor, to include the nature and history of science; that is, the student:

- S2a:** knows that doing science requires varying human abilities, interest and habits of mind (such as: reasoning, insight, skill, creativity, intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas).
- S2b:** describes examples of scientists working in teams and alone to solve problems.
- S2c:** explains the variety of contributions and discoveries about objects, events, and phenomena in nature that were made by men and women who chose careers in science.
- S2d:** describes ways that scientists have used new evidence to make modifications to existing explanations.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, and the risks and benefits associated with natural and personal hazards; that is, the student:

- S3a:** demonstrates personal and group safety and resource conservation.
- S3b:** explores the personal and societal challenges caused by both natural hazards and hazards that result from human activities.
- S3c:** utilizes a systematic approach to analyze risks and benefits associated with natural and personal hazards.
- S3d:** compares the positive and negative impacts of technological advances on society.

DoDEA Grade 5 Science Standards

S4: Science and Technology

The student demonstrates an understanding about science and technology and the nature of technological design; that is, the student:

S4a: demonstrates how tools and technology advance scientific investigations and knowledge.

S4b: uses technology to assist in the design of solutions to identified problems.

S4c: determines criteria to evaluate the effectiveness of a solution.

S4d: evaluates an invention that solves a problem and determines ways to improve the design.

S5: Physical Science

The student demonstrates a conceptual understanding of matter, motion and energy; that is, the student:

S5a: examines and describes properties of common elements.

S5b: measures, explains, and predicts the relationship between the strength of a force and its effect on the motion of an object.

S5c: demonstrates that energy occurs in different forms (heat, light, sound, electrical, and magnetic) and can change forms.

S6: Life Science

The student demonstrates a conceptual understanding of the structure and function of living systems, and ecosystems; that is, the student:

S6a: describes the cell as the basic structure of all organisms, and explains its organization into tissues, organs, and systems, including their structures and functions.

S6b: explains why reproduction is essential to the continuation of a species.

S6c: examines and describes the flow of matter and energy in ecosystems and develops examples of food chains and food webs that show the interdependence of organisms in an environment.

S7: Earth and Space Sciences

The student demonstrates a conceptual understanding of Earth's systems, history, and significance in the solar system; that is, the student:

S7a: investigates and describes the composition and structure of the lithosphere and classifies rocks/minerals and their associated fossils.

S7b: discusses how global weather patterns and climate relate to local weather.

S7c: describes the relationships among the Earth, sun, and moon (i.e., tilt of axis, revolution, rotation) as it relates to seasons, tides, and eclipses.

DoDEA Grade 6 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

- S1a:** develops research questions that can be answered through scientific investigations.
- S1b:** accesses, evaluates and uses information from a variety of reliable sources.
- S1c:** designs, conducts, and records scientific investigations following the general procedures of scientific inquiry.
- S1d:** applies appropriate tools and techniques to systematically collect, record, analyze, interpret and present data.
- S1e:** develops logical descriptions, explanations, predictions, and models using evidence.
- S1f:** recognizes and analyzes interpretations, conclusions, and predictions based upon alternative evidence and explanations.
- S1g:** communicates scientific procedures, explanations, and conclusions using appropriate scientific language and mathematics.

S2: History and Nature of Science

The student demonstrates an understanding of science as a human endeavor, and the history and nature of science; that is, the student:

- S2a:** describes how doing science requires varying human abilities, interest and habits of mind (such as: reasoning, insight, skill, creativity, intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.)
- S2b:** identifies contributions of individuals from diverse cultures who have extended the knowledge in science and technology.
- S2c:** explains how the effects of science and technology affect cultural development, innovation and human history.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety and risks and benefits associated with natural and personal hazards; that is, the student:

- S3a:** demonstrates personal and group safety and resource conservation.
- S3b:** compares the safety precautions needed during different natural hazards.
- S3c:** describes the risks, costs, and benefits of human decisions related to natural hazards.
- S3d:** explores causes of environmental degradation and resources depletion.

DoDEA Grade 6 Science Standards

S4: Science and Technology

The student demonstrates an understanding about science and technology, and the nature of technological design; that is, the student:

- S4a:** explores how societal challenges may drive scientific research.
- S4b:** designs and conducts a test on an invention (or existing product) based on specified criteria.
- S4c:** compares the intended benefits and unintended consequences of technology and how it impacts society.
- S4d:** describes how technology responds to societal needs.

S5: Physical Science

The student demonstrates a conceptual understanding of matter, motions and forces, and transfer of energy; that is, the student:

- S5a:** investigates how some common elements combine to form mixtures and compounds.
- S5b:** identifies and illustrates the multiple forces on the movement, speed, and direction of an object.
- S5c:** communicates how energy can be transferred through conduction, convection, and radiation, and how objects have potential energy and kinetic energy.

S6: Life Science

The student demonstrates a conceptual understanding of the structure and function of living systems, populations and ecosystems; that is, the student:

- S6a:** compares and contrasts structure and function in single celled and multicellular organisms.
- S6b:** compares asexual and sexual reproduction and infers their role in the survival of a species.
- S6c:** assesses the relationships among producers, consumers, and decomposers in ecosystems.

S7: Earth and Space Sciences

The student demonstrates a conceptual understanding of the Earth's systems, history, and place in the solar system; that is, the student:

- S7a:** explains the processes of the Earth that produce gradual changes, such as weathering, erosion, and the development of landforms.
- S7b:** evaluates the impact of atmospheric changes (clouds, air masses and precipitation) and other factors (oceans, meteors, and glaciers) on weather, climate, and landforms.
- S7c:** catalogues the planets of this solar system including Earth.

DoDEA Grade 7 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

- S1a:** develops research questions that can be answered through scientific investigations.
- S1b:** accesses, evaluates and uses information from a variety of reliable scientific sources.
- S1c:** designs, conducts and records scientific investigations following the general procedures of scientific inquiry.
- S1d:** applies appropriate tools and techniques to systematically collect, record, analyze, and interpret data.
- S1e:** develops logical descriptions, explanations, predictions, and models using evidence.
- S1f:** recognizes and analyzes interpretations, conclusions, and predictions based upon alternative evidence and explanations.
- S1g:** communicates scientific procedures, explanations, and conclusions using appropriate scientific language and writing, and mathematics.

S2: History and Nature of Science

The student demonstrates an understanding of science as a human endeavor, and the history and nature of science; that is, the student:

- S2a:** recognizes that scientists are from diverse backgrounds, but that all use scientific habits of mind such as: (reasoning, insight, skill, creativity, intellectual honesty, tolerance for ambiguity, skepticisms, and openness to new ideas) in their work.
- S2b:** explains how scientists formulate and test their explanations, revising when necessary.
- S2c:** investigates and identifies how scientists communicate their results and ideas, and describes and identifies situations in which scientists disagree about interpretation of evidence.
- S2d:** examines the effects of science on cultural development and the relationship between scientific innovation and human history.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, natural and human hazards, and their risks and benefits; that is, the student:

- S3a:** demonstrates personal and group safety and resource conservation.
- S3b:** thinks critically about risks and benefits of natural, chemical, biological, and personal hazards.
- S3c:** explains environmental degradation on a global scale.

S4: Science and Technology

The student demonstrates an understanding about science and technology and the nature of technological design; that is, the student:

- S4a:** explains how societal challenges may impact scientific research.
- S4b:** tests a design or invention and evaluates its effectiveness.

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S4c: compares the intended benefits and unintended consequences of technology and how it impacts society.

S4d: describes how technology responds to societal needs.

S5: Physical Science

The student demonstrates a conceptual understanding of matter, motions and forces, and transfer of energy; that is, the student:

S5a: compares and contrasts chemical and physical properties of matter and groups materials according to those properties and their changes.

S5b: designs and conducts investigations to calculate the speed of moving objects and determine the forces acting on the object.

S5c: compares types of energy and explains how energy is transformed.

S6: Life Science

The student demonstrates a conceptual understanding of the structure and function of living systems, populations and ecosystems, that is, the student:

S6a: communicates an understanding of the specialized structures and functions found in humans (multicellular organisms).

S6b: examines the influence of genes and the environment on trait expression in organisms.

S6c: predicts how environmental changes may impact the survival of organisms.

S7: Earth and Space Sciences

The student demonstrates a conceptual understanding of Earth systems, history, and place in the solar system; that is, the student:

S7a: compares constructive and destructive forces (e.g., plate tectonics, volcanoes, earthquakes) that cause rapid changes on the Earth's surface.

S7b: analyzes the four major interacting components (i.e., geosphere, hydrosphere, atmosphere, and biosphere) of the Earth's system.

S7c: describes and illustrates the features and structure of the sun and moon.

DoDEA Grade 8 Science Standards

S1: Scientific Inquiry

The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

- S1a:** develops research questions that can be answered through scientific investigations.
- S1b:** accesses, evaluates and uses information from a variety of reliable scientific sources.
- S1c:** designs, conducts and records scientific investigations following the general procedures of scientific inquiry.
- S1d:** applies appropriate tools and techniques to systematically collect, record, analyze, and interpret data.
- S1e:** develops logical descriptions, explanations, predictions, and models using evidence.
- S1f:** recognizes and analyzes interpretations, conclusions, and predictions based upon alternative evidence and explanations.
- S1g:** communicates scientific procedures, explanations, and conclusions using appropriate scientific language and writing, and mathematics.

S2: History and Nature of Science

The student demonstrates an understanding of science as a human endeavor and the history and nature of science; that is, the student:

- S2a:** cites examples of scientists from diverse backgrounds, and explains how they use scientific habits of mind such as: (reasoning, insight, skill, creativity, intellectual honesty, tolerance for ambiguity, skepticisms, and openness to new ideas) in their work.
- S2b:** explains how scientists formulate and test their explanations, revising when necessary.
- S2c:** investigates and explains how scientists communicate their results and ideas, and describes and identifies situations in which scientists disagree about interpretation of evidence.
- S2d:** examines the effects of science on cultural development and states the relationship between scientific innovation and human history.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of safety, natural and human hazards, and their risks and benefits; that is, the student:

- S3a:** demonstrates personal and group safety and resource conservation when engaged in science.
- S3b:** thinks critically and analyzes risks and benefits associated with natural, chemical, biological, and personal hazards.
- S3c:** evaluates the interrelationships of environmental degradation on the global community.

S4: Science and Technology

The student demonstrates an understanding about science and technology and the nature of technological design; that is, the student:

- S4a:** assesses societal challenges that may inspire scientific research.

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S4b: evaluates an invention or design and proposes modifications.

S4c: identifies a technological problem and develops a plan for design, implementation, and evaluation.

S4d: explores how technological risks lead to new technologies and how unintended consequences impact society.

S4e: analyzes how technology responds to societal, political, and economic needs.

S5: Physical Science

The student demonstrates a conceptual understanding of matter, motions and forces, and transfer of energy; that is, the student:

S5a: examines density, boiling point, and chemical reactivity of materials and explains conservation of matter.

S5b: determines and communicates the relationship between motions and forces, including inertia and net effects of balanced and unbalanced forces.

S5c: compares and explains different forms of energy as heat, light, electricity, mechanical motion, sound, and chemical.

S6: Life Science

The student demonstrates a conceptual understanding of the structure and function of living systems, populations and ecosystems, that is, the student:

S6a: applies the concept of system failure to disease in the human organism at the cellular, tissue, organ, and system levels.

S6b: determines and compares the role of heredity and natural selection for survival of human and non-human organisms.

S6c: generalizes how adaptive characteristics of a species (a population) influence their chance for survival or possible extinction.

S7: Earth and Space Sciences

The student demonstrates a conceptual understanding of the Earth's systems and history; that is, the student:

S7a: analyzes and evaluates the impact of constructive and destructive forces on the Earth and its inhabitants over geologic time.

S7b: examines and interprets the Earth's stratigraphic record in relation to constructive and destructive forces.

S7c: compares the Sun to other stars and galaxies.

DoDEA Science Standards Grades 9-12 Overview

Key Scientific Concepts

In each DoDEA high school science course, students further the development of major concepts and processes including:

- Systems, order, and organization
- Evidence, models, and explanation
- Change, constancy, equilibrium and measurement
- Theories of evolution such as biological, chemical and geological
- Form and function

Standards Included in Every Course

Included in every high school science course are the strands of scientific inquiry, the history and nature of science, science in personal and social perspectives, science and technology, and specific content standards. These standards provide all students with a facility in scientific investigations and an ability to make connections across the sciences, mathematics, and technology.

Each science course contributes to the student's content knowledge, the development of process skills, and the development of science literacy, to make the study of science a worthwhile lifetime endeavor. Specific courses engage students in deepening their knowledge, skills and understandings related to the standards.

DoDEA High School Science Courses

Courses that directly address and support the DoDEA high school science standards and provide students with optional and expanded opportunities for learning in specific science areas are:

Biology, Human Anatomy & Physiology, Marine Biology, Oceanography, AP Biology, Environmental Science

Introduction to Physics; **Physics**; AP Physics B, AP Physics C

Chemistry Applications in the Community; **Chemistry**, AP Chemistry

Earth and Space Science, Astronomy

Science Technology Society, Science Research

S1: Scientific Inquiry

The student extends their understanding of scientific inquiry and their ability to conduct scientific investigations; that is, the student:

- S1a:** constructs questions that initiate and guide scientific investigations.
- S1b:** designs and conducts scientific investigations using established procedures that are safe, humane, and ethical.
- S1c:** uses technology and mathematics to systematically gather, record, analyze, explain, and interpret data.
- S1d:** formulates and revises scientific conclusions, explanations and models (physical, conceptual, mathematical) based on scientific knowledge, logic, and evidence.
- S1e:** recognizes, analyzes and evaluates alternative explanations and models.
- S1f:** evaluates and defends scientific arguments, acknowledging references and contributions of others.
- S1g:** communicates the scientific inquiry process using appropriate scientific language and mathematics.

S2: History and Nature of Science

The student demonstrates understanding of science as a human endeavor, examining the nature of scientific knowledge and historical perspectives; that is, the student:

- S2a:** describes how the work of scientists is influenced by their ethical standards and by societal, cultural, and personal beliefs, and how scientists use the habits of mind such as: (reasoning, insight, creativity, intellectual honesty, tolerance for ambiguity and openness to new ideas) in their work.
- S2b:** compares and contrasts the difference between science and other ways of knowing through use of empirical standards, logical arguments, and skepticism.
- S2c:** assesses the work of scientists showing that all scientific ideas depend on experimental and observational confirmation and are subject to change as new evidence becomes available.
- S2d:** describes the contributions of diverse cultures to scientific knowledge and the changes to scientific thinking that evolve over time, building upon earlier knowledge.

S3: Science in Personal and Social Perspectives

The student demonstrates an understanding of the impact each individual, community, and human enterprise has on natural conditions and resources from local, national, and global perspectives; that is, the student:

- S3a:** employs the tenets of personal and community health, safety and resource conservation.

- S3b:** identifies, accesses and uses data to construct explanations about the characteristics, rates, and sources of changes in populations, natural resources, and environmental quality.
- S3c:** assesses potential danger and risk of natural and human-induced hazards.
- S3d:** analyzes the relationships among technological, social, political, and economic changes and the impact on humans and the environment.

S4: Science and Technology

The student demonstrates abilities of technological design and understandings about science, engineering and technology; that is, the student:

- S4a:** uses technology to perform scientific investigations to secure valid and reliable results.
- S4b:** identifies and/or constructs a problem or need in relation to technological designs; proposes new designs and chooses between alternative solutions.
- S4c:** constructs understandings about the fields of science and engineering, the interrelationships between science and technology, and explains their contribution to society.
- S4d:** analyzes innovations in science and technology with respect to alternatives, risks, costs and benefits to society and the environment.

S5: Biology

The student demonstrates a conceptual understanding of the organization of life on Earth; that is, the student:

- S5a:** describes, analyzes and compares structure, function, and organization of various cells.
- S5b:** communicates an understanding of the biochemistry of life including organic compounds, enzymes, respiration and photosynthesis.
- S5c:** describes the behavior of organisms and hypothesizes the relationship to nervous and endocrine systems and various external stimuli.
- S5d:** elaborates on the principles of genetics and explains the role of DNA, genes, chromosomes, and mutation in reproduction and heredity.
- S5e:** relates theories of biological evolution to geologic time and addresses speciation, biodiversity, natural selection, and biological classification.
- S5f:** examines ecology as interrelationships of biotic and abiotic factors and explains the transfer of matter and energy within ecosystems.

S6: Physics

The student demonstrates a conceptual understanding of the organization and interaction of matter and energy, and motion and forces; that is, the student:

- S6a:** communicates an understanding of atomic and subatomic structure, addressing parts and properties of the atom, electron configuration, nuclear forces, radioactivity, and nuclear reactions.
- S6b:** analyzes and explains the relationship between structure and properties of matter (ions, molecules, compounds, elements, isotopes) and uses those relationships to predict chemical properties of elements and placement on the periodic table.
- S6c:** articulates and demonstrates the principles of motions and forces and applies them to examples of impact on objects.
- S6d:** analyzes the distinctions among thermal, potential, and kinetic energy and explains conservation of energy and its associated increase in disorder.
- S6e:** differentiates the interactions between matter and energy and uses waves and wave properties (including light, sound, transverse, longitudinal and electromagnetic waves) to identify matter.

S7: Chemistry

The student demonstrates a conceptual understanding of the organization and behavior of matter; that is, the student:

- S7a:** communicates an understanding of atomic structure, addressing parts and properties of the atom, electron configuration and nuclear forces.
- S7b:** analyzes and demonstrates the relationship between structure and properties of matter (ions, molecules, compounds, elements) and uses those relationships to predict chemical properties of elements and their placement on the periodic table.
- S7c:** assesses interactions of matter focusing on chemical reactions and bonds and applies the concept of conservation of matter to those interactions.
- S7d:** distinguishes the interactions of matter and energy and demonstrates the impact of variables (temperature, time, etc.) on those interactions.
- S7e:** summarizes and illustrates the conservation of energy, the increase in disorder, and the different types of energy.

S8: Earth and Space Sciences

The student demonstrates a conceptual understanding of the organization of Earth and other celestial bodies; that is, the student:

- S8a:** categorizes the sources and types of energy in the Earth system, identifies the geologic activity (such as volcanoes, plate tectonics, and earthquakes) resulting from or causing that energy, and illustrates the impact of such activity on the inhabitants and the environment.
- S8b:** compares and contrasts the composition of Earth materials and the processes within the geochemical cycle that govern their formation (including rocks, minerals, fossils, and other natural resources).
- S8c:** investigates and displays the relationships among weather, cloud cover, land features, atmosphere and oceans.
- S8d:** presents and critiques theories on origin and evolution of the Earth's systems and other celestial bodies.
- S8e:** accesses information about significant space explorations and assesses the value of such explorations.