

ADVENTIST EDUCATION STANDARDS

Standards, what learners should know (content) and be able to do (skills), serve as the framework for curriculum development. Standards in NAD Seventh-day Adventist schools reflect the Adventist worldview across the K-12 curricula as well as the integration of national and provincial/state standards. The Adventist worldview accepts the Bible as the standard by which everything else is measured. Four key concepts emerge from a biblical worldview that can be used as a lens for curriculum development, as well as informing the essential questions and big ideas of any content area: Creation (What is God's intention?), Fall (How has God's purpose been distorted?), Redemption (How does God help us to respond?), and Re-creation (How can we be restored in the image of God?).

— THE CORE OF ADVENTIST EDUCATION CURRICULUM

SCIENCE AND ENGINEERING PRACTICES

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

— NEXT GENERATION SCIENCE STANDARDS

STANDARDS CODING

The standards have been coded so that educators can easily refer to them in their curriculum, instruction, and assessment practices. The coding system that precedes each standard begins with the content area abbreviation in letters; all are identified with S—Science (S.K-2.LS.1). The second part of the code refers to the grade level (S.K-2.LS.1). The third part of the code refers to the particular science domain (S.K-2.LS.1), with LS standing for Life Sciences. The fourth part of the code refers to a particular skill within the science domain (S.K-2.LS.1). The coding system that follows each standard is the Next Generation Science Standards (NGSS) that aligns with the NAD standard. Where no NGSS is noted, there is no corresponding NGSS.

PERFORMANCE-BASED STANDARDS

The science standards are performance-based outcomes (what students should be able to do) rather than content-based outcomes (what students should know). The content standards are implied within the context of the performance standards.

CREDITS

The following resources were referenced in developing Science Standards for Seventh-day Adventist Schools: a sampling of state standards, NAD Curriculum Guide for Science, Next Generation Science Standards (NGSS), National Health Education Standards (NHES), and the Core of Adventist Education Curriculum.

DEVELOPMENT COMMITTEE MEMBERS

Betty Bayer	Seventh-day Adventist Church in Canada Associate Director of Education
Carol Campbell	North American Division Director of Elementary Education
Lee Davidson	Andrews University Teacher Education Department Chair
Ileana Espinosa	Columbia Union Associate Director of Elementary Education
Jerrell Gilkeson	Atlantic Union Associate Director of Elementary Education
Randy Gilliam	Southwestern Union Director of Education
Martha Havens	Pacific Union Associate Director of Elementary Education
LouAnn Howard	Mid-America Union Associate Director of Elementary Education
Jim Martz	Lake Union Associate Director of Elementary Education
Patti Revolinski	North Pacific Union Associate Director of Elementary Education
Diane Ruff	Southern Union Associate Director of Elementary Education
Dan Wyrick	Nature by Design Director

LIFE SCIENCES

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION
Essential Question: How do living organisms give evidence of God as the Designer, Creator, and Sustainer of life?		Big Idea: The complexity, order, and design of living organisms provide strong evidence of God as the Designer, Creator and Sustainer of life.	Bold = included content <i>Italic =</i> related content
K-2	Molecules to Organisms: Structures and Processes	S.K-2.LS.1 Use observations to describe patterns (e.g., animals need to take in food but plants do not, different kinds of food needed by different types of animals, requirement of plants to have light, all living things need water) of what plants and animals (including humans) need to survive. (K-LS1-1)	Level 1 – Ch. 1.1, 1.2, Ch. 2.3, Ch. 3.2 Level 2 – Ch. 1.1, 1.4, Ch. 2.1
		S.K-2.LS.2 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs (e.g., designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills). (1-LS1-1)	Level 1 – Ch. 1.1, 1.2, Ch. 2.1, 2.2, 2.3 Level 2 – Ch. 1.2, 1.5
		S.K-2.LS.3 Make observations to determine patterns in behavior of parents and offspring that help offspring survive (e.g., signals that offspring make such as crying, cheeping and the responses of parents such as feeding, comforting, protecting). (1-LS1-2)	Level 1 – Ch. 2.3 Level 2 – Ch. 1.4
	Ecosystems: Interactions, Energy, and Dynamics	S.K-2.LS.4 Plan and conduct an investigation to determine if plants need sunlight and water to grow, ensuring that only one variable is tested at a time. (2-LS2-1)	Level 1 – Ch. 1.2 Level 2 – Ch. 1.1, 1.2
		S.K-2.LS.5 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. (2-LS2-2)	Level 1 – Ch. 1.2 <i>Level 2 – Ch. 1.2</i>
	Heredity: Inheritance and Variation of Traits	S.K-2.LS.6 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents (e.g., leaves from same kind of plant are the same shape but can differ in size, young animals look similar to their parents but are not exactly the same). (1-LS3-1)	Level 1 – Ch. 1.2, Ch. 2.3
	Life: Origins, Unity, and Diversity	S.K-2.LS.7 Make observations of plants and animals to compare the diversity of life in different habitats. (2-LS4-1)	Level 1 – Ch. 3.1 Level 2 – Ch. 2.1
		S.K-2.LS.8 Apply scientific principles to begin to construct a personal model that explains how life began on earth and acknowledges God as the Creator.	<i>Level 1 – Ch. 1.1, Ch. 2.2, Ch. 8.1</i> <i>Level 2 – Ch. 8.1, 8.2</i>
3-5	Molecules to Organisms: Structures and Processes	S.3-5.LS.1 Develop models (e.g., drawings, diagrams) to describe that organisms have unique and diverse life cycles but all have birth, growth, reproduction, and death in common. (3-LS1-1)	Level 3 – Ch. 1.3, Ch. 2.1, 2.2 Level 4 – Ch. 1.4 Level 5 – Ch. 1.3, Ch. 5.1, 5.2, 5.3, Ch. 6.1, 6.2
		S.3-5.LS.2 Construct an argument that plants and animals have internal and external structures (e.g., thorns, stems, roots, colored petals, heart, stomach, lung, brain, skin) that function to support survival, growth, behavior, and reproduction. (4-LS1-1)	Level 3 – Ch. 2.1, Ch. 5.1, Ch. 6.1 Level 4 – Ch. 1.1, 1.3, 1.4, Ch. 2.1, 2.2 Level 5 – Ch. 3.1, 3.2, 3.3, 3.4, Ch. 4.3, Ch. 5.2, 5.3, Ch. 6.1, 6.2
		S.3-5.LS.3 Use a model to describe systems of information transfer (e.g., nerves, hormones) that animals use to receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. (4-LS1-2)	Level 4 – Ch. 4.1, Ch. 5.2
		S.3-5.LS.4 Support an argument that plants get the materials they need for growth chiefly from air and water. (5-LS1-1)	Level 3 – Ch. 2.1, 2.3 Level 4 – Ch. 1.1
	Ecosystems: Interactions, Energy, and Dynamics	S.3-5.LS.5 Construct an argument that some animals form groups that help members survive. (3-LS2-1)	Level 4 – Ch. 2.2, Ch. 3.2 Level 5 – Ch. 3.3, Ch. 4.1, 4.3
		S.3-5.LS.6 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (5-LS2-1)	Level 3 – Ch. 3.1 Level 4 – Ch. 3.1, 3.2, 3.3, 3.4 Level 5 – Ch. 4.1, 4.2, 4.3
	Heredity: Inheritance and Variation of Traits	S.3-5.LS.7 Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. (3-LS3-1)	Level 3 – <i>Ch. 1.1, 1.3, Ch. 2.2</i> Level 4 – Ch. 1.1, 1.4 Level 5 – Ch. 1.3, <i>Ch. 6.1</i>
		S.3-5.LS.8 Use evidence to support the explanation that traits can be influenced by the environment (e.g., Galapagos finches, peppered moth). (3-LS3-2)	Level 3 – <i>Ch. 3.1, 3.2, 3.3, 3.4</i> Level 4 – Ch. 2.1, 2.2, Ch. 3.3 Level 5 – Ch. 3.1, 3.2, 3.3, 3.4
	Life: Origins, Unity, and Diversity	S.3-5.LS.9 Analyze and interpret data (e.g., type, size, distributions) from fossils to provide evidence of the organisms and the environments (e.g., marine fossils on dry land, tropical plant fossils in Arctic areas, fossils of extinct organisms) in which they lived long ago. (3-LS4-1)	Level 4 – Ch. 8.2
		S.3-5.LS.10 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing (e.g., plants with larger thorns are less likely to be eaten by predators, animals with better camouflage coloration are more likely to survive and to reproduce). (3-LS4-2)	Level 4 – Ch. 2.1, 2.2 Level 5 – Ch. 3.1, 3.2, 3.3
		S.3-5.LS.11 Construct an argument with evidence (e.g., needs, characteristics) that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. (3-LS4-3)	Level 3 – Ch. 3.1, 3.2, 3.3, 3.4 Level 4 – Ch. 2.1, 2.2, Ch. 3.3
		S.3-5.LS.12 Make a claim about the merit of a plant or animal adaptation in response to an environmental change (e.g., land characteristics, water distribution, temperature, food, other organisms). (3-LS4-4)	<i>Level 3 – Ch. 3.2, 3.3, 3.4</i> Level 4 – Ch. 2.1, 2.2, Ch. 3.2, 3.3 Level 5 – Ch. 3.1, 3.2, 3.3, 3.4, Ch. 4.3
		S.3-5.LS.13 Construct an argument with evidence to support that God has created within living things a pool of variations that allows organisms to adapt to changes in the environment.	Level 4 – Ch. 2.1, 2.2 Level 5 – Ch. 3.1, 3.2, 3.3, 3.4
		S.3-5.LS.14 Apply scientific principles to construct a personal model that explains origins of life on earth and acknowledges God as the Creator.	Level 3 – Ch. 1.1 Level 4 – Ch. 1.1, 1.2, Ch. 4.1 Level 5 – Ch. 1.1, 1.2, 1.3

LIFE SCIENCES CONTINUED

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION
6-8	Molecules to Organisms: Structures and Processes	S.6-8.LS.1 Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells. (MS-LS1-1)	Level 6 – Ch. 1.1, Ch. 2.1, 2.2, 2.3 Level 7 – Ch. 1.1
		S.6-8.LS.2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. (MS-LS1-2)	Level 6 – Ch. 2.1, 2.2, 2.3, 2.4, Ch. 3.1, 3.2, 3.3 Level 7 – Ch. 4.1, Ch. 6.1
		S.6-8.LS.3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. (MS-LS1-3)	Level 6 – Ch. 2.3, Ch. 4.1, 4.2, 4.3, 4.4, 4.5
		S.6-8.LS.4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors (e.g., nest building, herding, vocalization, colorful plumage) and specialized plant structures (e.g., bright flowers, flower nectar, odors that attract insects that transfer pollen, hard shells on nuts that squirrels bury) affect the probability of successful reproduction of animals and plants respectively. (MS-LS1-4)	Level 6 – Ch. 1.1 Level 7 – Ch. 3.3, 3.4 Level 8 – Ch. 1.1, Ch. 2.4, Ch. 3.3, Ch. 4.2, 4.4
		S.6-8.LS.5 Construct a scientific explanation based on evidence (e.g., drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, fish growing larger in large ponds) for how environmental (e.g., availability of food, light, space, water) and genetic (e.g., large breed cattle and species of grass affecting growth) factors influence the growth of organisms. (MS-LS1-5)	Level 7 – Ch. 1.1, 1.2, 1.3, 1.4, Ch. 4.2, 4.3 Level 8 – Ch. 3.2, 3.3, Ch. 4.1, 4.3, 4.4
		S.6-8.LS.6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. (MS-LS1-6)	Level 6 – Ch. 2.3, 2.4 Level 8 – Ch. 3.1
		S.6-8.LS.7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. (MS-LS1-7)	Level 6 – Ch. 1.3, Ch. 2.4, Ch. 3.2 Level 7 – Ch. 1.2, 1.3, 1.4 Level 8 – Ch. 2.1
		S.6-8.LS.8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories. (MS-LS1-8)	Level 6 – Ch. 4.2, 4.4, 4.5
	Ecosystems: Interactions, Energy, and Dynamics	S.6-8.LS.9 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1)	Level 8 – Ch. 4.1, 4.3, 4.4
		S.6-8.LS.10 Construct an explanation that predicts patterns of interactions (e.g., competitive, predatory, mutually beneficial) among organisms across multiple ecosystems. (MS-LS2-2)	Level 8 – Ch. 4.1, 4.3, 4.4, 4.5
		S.6-8.LS.11 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (MS-LS2-3)	Level 6 – Ch. 1.1, 1.2, 1.3 Level 8 – Ch. 3.1, Ch. 4.1, 4.3
		S.6-8.LS.12 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4)	Level 8 – Ch. 4.1, 4.3, 4.4
		S.6-8.LS.13 Evaluate competing design solutions (e.g., scientific, economic, social considerations) for maintaining biodiversity and ecosystem services (e.g., water purification, nutrient recycling, soil erosion prevention, habitat enhancement). (MS-LS2-5)	Level 8 – Ch. 3.3, Ch. 4.1, Ch. 9.1, 9.2, 9.3, 9.4
	Heredity: Inheritance and Variation of Traits	S.6-8.LS.14 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. (MS-LS3-1)	Level 6 – Ch. 3.1, 3.2 Level 7 – Ch. 4.1
		S.6-8.LS.15 Develop and use a model (e.g., Punnett squares, diagrams, simulations) to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. (MS-LS3-2)	Level 6 – Ch. 3.1 Level 7 – Ch. 4.1, 4.2, 4.3 Level 8 – Ch. 2.2, 2.3, 2.4
	Life: Origins, Unity, and Diversity	S.6-8.LS.16 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth, comparing and contrasting creationist and naturalist perspectives. (MS-LS4-1)	Level 6 – Ch. 10.1, 10.2, 10.3 Level 8 – Ch. 1.2, 1.3, Ch. 10.3
		S.6-8.LS.17 Apply scientific principles to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms, comparing and contrasting creationist and naturalist perspectives. (MS-LS4-2)	Level 6 – Ch. 10.1, 10.2, 10.3 Level 8 – Ch. 1.3, Ch. 10.3
		S.6-8.LS.18 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. (MS-LS4-4)	Level 6 – Ch. 1.1 Level 7 – Ch. 4.2, 4.3 Level 8 – Ch. 1.1, Ch. 3.2, Ch. 4.2, 4.4
		S.6-8.LS.19 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. (MS-LS4-5)	Level 7 – Ch. 4.4
		S.6-8.LS.20 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. (MS-LS4-6)	Level 7 – Ch. 4.1, 4.2 Level 8 – Ch. 1.1, Ch. 4.2, 4.3, 4.4
		S.6-8.LS.21 Apply scientific principles to construct and share a personal model that explains origins of life on earth and acknowledges God as the Creator.	Level 6 – Ch. 1.1, 1.2, 1.3 Level 7 – Ch. 1.1, Ch. 4.1 Level 8 – Ch. 1.1, 1.2, Ch. 10.2, 10.3