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

PHYSICAL SCIENCES

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)		BY DESIGN CHAPTER CORRELATION
Essential Question: How does the order and consistency of natural laws provide evidence of God as the Designer, Creator, and Sustainer of the physical world?			**Big Idea:** Matter and energy are organized and behave according to natural laws that cannot be explained by chance but are consistent and give evidence of God as the Designer, Creator, and Sustainer.	**Bold** = included content *Italic* = related content
K-2	**Matter and Its Interactions**	**S.K-2.PS.1**	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties (e.g., color, texture, hardness, flexibility). (2-PS1-1)	Level 2 – Ch. 9.1, 9.2
		S.K-2.PS.2	Analyze data obtained from testing different materials to determine which materials have the properties (e.g., strength, flexibility, hardness, texture, absorbency) that are best suited for an intended purpose. (2-PS1-2)	*Level 2 – Ch. 9.1*
		S.K-2.PS.3	Make observations to construct an evidence-based account of how an object made of a small set of pieces (e.g., blocks, building bricks, other assorted small objects) can be disassembled and made into a new object. (2-PS1-3)	Level 2 – Ch. 9.2, 9.3
		S.K-2.PS.4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed (e.g., water, butter) and some cannot (e.g., cooking an egg, freezing a plant leaf, heating paper). (2-PS1-4)	Level 1 – Ch. 10.1 Level 2 – Ch. 9.2, 9.3, Ch. 10.2
	Motion and Stability: Forces and Interactions	**S.K-2.PS.5**	Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls (e.g., string attached to an object being pulled, pushing an object, stopping a rolling ball, two objects colliding and pushing on each other) on the motion of an object. (K-PS2-1)	Level 1 – Ch. 9.2, 9.3
		S.K-2.PS.6	Analyze data to determine if a design solution (e.g., ramp to increase speed of an object, structure that causes an object to turn) works as intended to change the speed or direction of an object with a push or a pull. (K-PS2-2)	Level 1 – Ch. 9.2, 9.3
	Energy	**S.K-2.PS.7**	Make observations to determine the effect of sunlight on Earth's surface (e.g., sand, soil, rocks, water). (K-PS3-1)	Level 1 – Ch. 10.1 Level 2 – Ch. 10.2
		S.K-2.PS.8	Use tools and materials to design and build a structure (e.g., umbrellas, canopies, tents) that will reduce the warming effect of sunlight on an area. (K-PS3-2)	Level 2 – Ch. 7.3, Ch. 10.2
	Waves and Their Applications in Technologies for Information Transfer	**S.K-2.PS.9**	Plan and conduct investigations to provide evidence that vibrating materials (e.g., tuning forks, plucking a stretched string) can make sound and that sound can make materials vibrate (e.g., holding a piece of paper near a speaker, holding an object near a vibrating tuning fork). (1-PS4-1)	Level 1 – Ch. 10.2 Level 2 – Ch. 10.3
		S.K-2.PS.10	Make observations (e.g., those made in a completely dark room, pinhole box, video of a cave explorer) to construct an evidence-based account that objects can be seen only when illuminated (e.g., external light source, object giving off its own light). (1-PS4-2)	Level 2 – Ch. 10.3
		S.K-2.PS.11	Plan and conduct an investigation to determine the effect of placing objects made with different materials (e.g., transparent, translucent, opaque, reflective) in the path of a beam of light. (1-PS4-3)	Level 2 – Ch. 10.3
		S.K-2.PS.12	Use tools and materials to design and build a device (e.g., light source, paper cup and string "telephones," drum beats pattern) that uses light or sound to solve the problem of communicating over a distance. (1-PS4-4)	*Level 1 – Ch. 10.2* *Level 2 – Ch. 10.3*
3-5	**Matter and Its Interactions**	**S.3-5.PS.1**	Develop a model to describe that matter is made of particles too small to be seen (e.g., add air to expand a basketball, compress air in a syringe, dissolve sugar in water, evaporate salt water). (5-PS1-1)	Level 4 – Ch. 10.1, 10.2, 10.3
		S.3-5.PS.2	Measure and graph quantities to provide evidence that the total weight of matter is conserved regardless of the type of change (e.g., phase changes, dissolving, mixing) that occurs when heating, cooling, or mixing substances. (5-PS1-2)	Level 4 – Ch. 10.1, 10.4, 10.5
		S.3-5.PS.3	Make observations and measurements to identify materials (e.g., powders, metals, minerals, liquids) based on their properties (e.g., color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, solubility). (5-PS1-3)	Level 4 – Ch. 8.1, Ch. 10.1, 10.2, Ch. 11.1, 11.2
		S.3-5.PS.4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (5-PS1-4)	Level 4 – Ch. 10.4, 10.5
	Motion and Stability: Forces and Interactions	**S.3-5.PS.5**	Plan and conduct an investigation to provide evidence of the effects of balanced (e.g., pushing two opposite sides of a box) and unbalanced (e.g., pushing one side of a box) forces on the motion of an object. (3-PS2-1)	Level 3 – Ch. 11.2, 11.3 Level 5 – Ch. 13.1, 13.2, 13.3
		S.3-5.PS.6	Observe and/or measure an object's motion to provide evidence that a pattern can be used to predict future motion (e.g., child swinging, ball rolling in a bowl, pendulum). (3-PS2-2)	Level 3 – Ch. 11.1, 11.2 Level 5 – Ch. 13.1, 13.2, 13.3
		S.3-5.PS.7	Ask questions to determine cause and effect relationships (e.g., distance between objects affects strength of the force, orientation of magnets affect direction of magnetic force) of electric or magnetic interactions between two objects not in contact with each other. (3-PS2-3)	Level 4 – Ch. 11.1, 11.2, 11.3
		S.3-5.PS.8	Define a simple design problem (e.g., constructing a door latch, creating a device to keep two moving objects from touching) that can be solved by applying scientific ideas about magnets. (3-PS2-4)	Level 4 – Ch. 11.1, 11.2
		S.3-5.PS.9	Support an argument that the gravitational force exerted by Earth on objects is directed down toward the center of the earth. (5-PS2-1)	Level 3 – Ch. 9.2, Ch. 11.2 Level 5 – Ch. 13.3
	Energy	**S.3-5.PS.10**	Use evidence to construct an explanation relating the speed of an object to the energy of that object. (4-PS3-1)	Level 3 – Ch. 10.1, 10.3, Ch. 11.1, 11.2 Level 4 – 10.2 Level 5 – Ch. 13.2, 13.3
		S.3-5.PS.11	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (4-PS3-2)	Level 3 – Ch. 10.2, 10.3, 10.4 Level 4 – Ch. 11.2 Level 5 – Ch. 11.2, 11.3, Ch. 12.1, 12.3
		S.3-5.PS.12	Ask questions and predict outcomes about the changes in energy that occur when objects collide. (4-PS3-3)	Level 3 – Ch. 11.2 Level 5 – Ch. 13.2, 13.3
		S.3-5.PS.13	Apply scientific principles to design, test, and refine a device (e.g., electric motor, solar heater) that converts energy from one form to another. (4-PS3-4)	Level 3 – Ch. 10.2, 10.3 Level 4 – Ch. 11.2, 11.3 Level 5 – Ch. 14.2, 14.3
		S.3-5.PS.14	Use models (e.g., diagrams, flow charts) to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. (5-PS3-1)	Level 3 – Ch. 2.3 *Level 4 – Ch. 3.1* Level 5 – Ch. 4.2, 4.3
	Waves and their Applications in Technologies for Information Transfer	**S.3-5.PS.15**	Develop a model (e.g., diagrams, analogies, physical models) of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (4-PS4-1)	Level 3 – Ch. 10.2, 10.3, Level 5 – Ch. 11.3
		S.3-5.PS.16	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. (4-PS4-2)	*Level 3 – Ch. 10.4* *Level 5 – Ch. 12.3* See Level 6 – Ch. 4.5
		S.3-5.PS.17	Generate and compare multiple solutions (e.g., drum sending codes through sound waves, grid of 1's and 0's representing black and white to send information about a picture, Morse code) that use patterns to transfer information. (4-PS4-3)	*Level 3 – Ch. 10.3* *Level 5 – Ch. 11.3*

PHYSICAL SCIENCES CONTINUED

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION
6-8	Matter and Its Interactions	**S.6-8.PS.1** Develop models (e.g., drawings, 3D ball and stick structures, computer representations) to describe the atomic composition of simple molecules (e.g., ammonia, methanol) and extended structures (e.g., sodium chloride, diamonds). (MS-PS1-1)	Level 6 – Ch. 12.1, 12.3 Level 8 – Ch. 13.1, 13.2, 13.3
		S.6-8.PS.2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction (e.g., burning sugar or steel wool, fat reacting with sodium hydroxide, mixing zinc with hydrogen chloride) has occurred. (MS-PS1-2)	Level 6 – Ch. 11.3, 11.4, Ch. 12.2 Level 8 – *Ch. 11.3*, Ch. 14.1, 14.2
		S.6-8.PS.3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society (e.g., new medicines, foods, alternative fuels). (MS-PS1-3)	Level 6 – Ch. 7.3 Level 8 – Ch. 9.1
		S.6-8.PS.4 Develop a model (e.g., drawings, diagrams) that predicts and describes changes in particle (e.g., molecules, inert atoms) motion, temperature, and state of a pure substance (e.g., water, carbon dioxide, helium) when thermal energy is added or removed. (MS-PS1-4)	Level 6 – Ch. 11.2 Level 7 – Ch. 14.1, 14.3 Level 8 – Ch. 11.1, Ch. 14.3
		S.6-8.PS.5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. (MS-PS1-5)	Level 6 – Ch. 11.3 Level 8 – Ch. 14.2, 14.3, 14.4
		S.6-8.PS.6 Design, construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. (MS-PS1-6)	Level 8 – Ch. 12.1, Ch. 14.1, 14.2
	Motion and Stability: Forces and Interactions	**S.6-8.PS.7** Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects (e.g., two cars, car and stationary objects, meteor and space vehicle). (MS-PS2-1)	Level 7 – Ch. 12.2, 12.3
		S.6-8.PS.8 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. (MS-PS2-2)	Level 7 – Ch. 12.1, 12.2, 12.3
		S.6-8.PS.9 Ask questions about data (e.g., effect of the number of turns of wire on the strength of an electromagnet, effect of increasing the number or strength of magnets on speed of an electric motor) to determine the factors that affect the strength of electric and magnetic forces (e.g., electromagnets, electric motors, generators). (MS-PS2-3)	Level 6 – Ch. 14.1, 14.2, 14.3
		S.6-8.PS.10 Construct and present arguments using evidence (e.g., data generated from simulations or digital tools; charts displaying mass, strength of interaction, distance from the Sun, orbital periods of objects within the solar system) to support the claim that gravitational interactions exert attraction and depend on the masses of interacting objects. (MS-PS2-4)	Level 7 – Ch. 8.1, 8.2, Ch. 9.1, 9.3
		S.6-8.PS.11 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact (e.g., interactions of magnets, electrically-charged strips of tape, electrically-charged pith balls). (MS-PS2-5)	Level 6 – Ch. 13.1, 14.1, 14.2, 14.3 *Level 7 – Ch. 12.3, 12.4*
	Energy	**S.6-8.PS.12** Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and the speed of an object (e.g., riding a bicycle at different speeds, rolling different sizes of rock downhill, getting hit by a Wiffle® ball versus a tennis ball). (MS-PS3-1)	Level 7 – Ch. 12.2, Ch. 14.1, 14.2
		S.6-8.PS.13 Develop a model (e.g., representations, diagrams, pictures, written descriptions) to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system (e.g., the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing direction/orientation of a magnet, balloon with static electrical charge brought close to a classmate's hair). (MS-PS3-2)	Level 6 – Ch. 13.1, Ch. 14.1 Level 7 – Ch. 12.3, Ch. 14.1, 14.2
		S.6-8.PS.14 Apply scientific principles to design, construct, and test a device (e.g., insulated box, solar cooker, Styrofoam® cup) that either minimizes or maximizes thermal energy transfer. (MS-PS3-3)	Level 7 – Ch. 14.3, 14.4
		S.6-8.PS.15 Plan an investigation (e.g., comparing final water temperatures after different masses of ice are melted in the same volume of water with the same initial temperature) to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. (MS-PS3-4)	Level 7 – Ch. 14.3, 14.4
		S.6-8.PS.16 Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. (MS-PS3-5)	Level 7 – Ch. 12.2, 12.3, Ch. 14.1, 14.2
	Waves and their Applications in Technologies for Information Transfer	**S.6-8.PS.17** Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. (MS-PS4-1)	Level 7 – Ch. 11.1, 11.2
		S.6-8.PS.18 Develop and use a model (e.g., drawings, simulations, written descriptions) to describe that waves are reflected, absorbed, or transmitted through various materials. (MS-PS4-2)	Level 7 – Ch. 11.1, 11.2, 11.4
		S.6-8.PS.19 Integrate qualitative scientific and technical information to support the claim that digitized signals (e.g., fiber optic cable transmits light pulses, radio wave pulses in Wi-Fi devices, conversion of stored binary patterns to make sound or text on a computer screen) are a more reliable way to encode and transmit information than analog signals. (MS-PS4-3)	*Level 7 – Ch. 11.3*