



• Elementary Science

2015

**ELEMENTARY SCIENCE STANDARDS
IN SEVENTH-DAY ADVENTIST SCHOOLS**

OFFICE OF EDUCATION | North American Division Seventh-day Adventist Church

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.

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2015 ELEMENTARY SCIENCE — PHYSICAL SCIENCES

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION	INQUIRY ACTIVITIES
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 <i>Italic =</i> related content	TE = TEACHER EDITION SE = STUDENT EDITION SJ = STUDENT JOURNAL TT = TRY THIS LA = LESSON ACTIVITY EAL = EXPLORE-A-LAB MS = MATH IN SCIENCE ATBD = ACTIVITY TO BE DEVELOPED
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	Level 2 – Sorting It Out SE 319/SJ 8; Mixed Up Animals TE 319/SJ 10; EAL 326
		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)	<i>Level 2 – Ch. 9.1</i>	Level 2 - ATBD
		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	Level 2 - ATBD
		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	Level 1 – Heating Things Up SE 301/SJ 28; EAL 302 Level 2 – TT 338, EAL 355
	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	Level 1 – Observing Motion SE 271/SJ 12; Changing Motion TE 271/SJ 14, EAL 272; Slow It Down TE 273/SJ 16, LA 275, TT 278; Make It Move SE 279/SJ 18; Move That Block TE 279/SJ 20, LA 281
		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	Level 1 – EAL 272, LA 275, TT 278; Make It Move SE 279/SJ 16; Move That Block TE 279/SJ 20
	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	Level 1 – EAL 302, LA 304 Level 2 – EAL 368
		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	Level 2 – EAL 368; ATBD
	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	Level 1 – TT 308; Making Different Sounds SE 309/SJ 34, EAL 310, EAL 311 Level 2 – EAL 375; ATBD
		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	Level 2 – Shine a Light SE 371/SJ 34; ATBD
		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	Level 2 – Shine a Light SE 371/SJ 34; ATBD
		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)	<i>Level 1 – Ch. 10.2</i> <i>Level 2 – Ch. 10.3</i>	Level 1 – ATBD Level 2 – ATBD

2015 ELEMENTARY SCIENCE — PHYSICAL SCIENCES CONTINUED

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION	INQUIRY ACTIVITIES
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	Level 4 – TT 338, TT 346; Look Closer and Closer SE 347/SJ 18; Making Mosaics TE 347/ SJ 20, EAL 350; To Dissolve or Not SE 351/ SJ 22; Temperature and Dissolving TE 351/ SJ 24
		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	Level 4 – TT 358; Making Rust TE 359/SJ 28, EAL 362
		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	Level 4 – TT 262; Mystery Rocks TE 266/SJ 34, EAL 367; To Dissolve or Not SE 353/SJ 22; Changing Matter SE 359/SJ 26; Making Rust TE 359/SJ 28; Magnetic Fields and Iron Filings SE 369/SJ 32, EAL 372, EAL 373, EAL 381
		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	Level 4 – EAL 356, TT 358; Changing Matter SE 359/ SJ 26; Making Rust TE 359/ SJ 32, EAL 362
	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	Level 3 – TT 350, EAL 342, EAL 348; Measuring Force SE 351/SJ 32; Pulling Force TE 352/SJ 34, EAL 358 Level 5 – EAL 423; Comparing Motion SE 435/SJ 58; Force, Mass, and Acceleration SE 441/SJ 62, EAL 442, EAL 445, EAL 446, EAL 448
		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	Level 3 – TT 340, EAL 348, EAL 358 Level 5 – Observing Sliding Friction SE 424/ SJ 54; Surface Area of Sliding Surface TE 424/ SJ 56, EAL 427, EAL 431; Comparing Ramp Height SE 435/SJ 58; Motion and Mass SE 435/ SJ 60; Forces, Mass, and Acceleration SE 441/ SJ 62; Increasing Mass TE 441/SJ 64, EAL 442, EAL 446, EALp448; Seltzer Rockets TE 449/SJ 66
		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	Level 4 – TT 368; Magnetic Fields and Iron Filings SE 369/SJ 32; Find the Magnet TE 369/SJ 34, EAL 372, EAL 373; Balloon Static SE 377/ SJ 40; Attractive Charges TE 377/SJ 42; Make an Electromagnet SE 385/SJ 44; Stronger Electromagnets TE 385/ SJ 46, EAL 386
		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	Level 4 – ATBD
		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	Level 3 – LA 352; ATBD Level 5 – EAL 442; Seltzer Rocket TE 449/ SJ 66

2015 ELEMENTARY SCIENCE — PHYSICAL SCIENCES CONTINUED

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION	INQUIRY ACTIVITIES
3-5	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	Level 3 – Models of Particles in a Liquid, a Solid and a Gas SE 305/SJ 8; Vibrating Confetti SE 321/SJ 16; Vibrating Strings TE 321/SJ 18, EAL 331, EAL 333; Racing Speed SE 341/SJ 28, EAL 342, EAL 348, EAL 358 Level 4 – ATBD Level 5 – Comparing Motion SE 435/SJ 58; Motion and Mass TE 435/SJ 60; Force, Mass, and Acceleration SE 441/SJ 62; Increasing Mass TE 441/SJ 64, EAL 448
		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	Level 3 – Transfer of Thermal Energy SE 313/SJ 12; Bring on the Heat TE 313/SJ 14, EAL 316, EAL 318; Vibrating Confetti SE 321/SJ 16; Vibrating Strings TE 321/SJ 18, EAL 322; How Waves Move SE 329/SJ 20 Level 4 – Melting and Boiling SE 339/SJ 14, TT 376; ATBD Level 5 – Sand Shaker SE 366/SJ 12, EAL 369; Light Bulb Energy SE 370/SJ 16; Lizard Lighting TE 370/SJ 18, EAL 372, EAL 374; Changes in Pitch and Loudness SE 376/SJ 20; Rubber Band Thickness and Pitch TE 376/ SJ 22; Build a Wave Machine SE 390/SJ 32; New Waves TE 390/SJ 34, EAL 397
		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	Level 3 – EAL 358 Level 5 – EAL 434, EAL 446; ATBD
		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	Level 3 – Solar Cooker SJ 44 Level 4 – Make an Electromagnet SE 385/ SJ 44; Building an Electric Motor SJ 50 Level 5 – Simple to Complex SE 473/SJ 88; Design a Machine TE 473/SJ 90, EAL 478, SJ 100
	Waves and their Applications in Technologies for Information Transfer	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	Level 3 – Colored Light Effects SE 69/SJ 34; Different Kinds of Light TE 69/SJ 36, EAL 72, Web of Life Mobile SJ 66 Level 4 – ATBD Level 5 – An Owl's Meal SE 138/SJ 104, LA 140, EAL 145
		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	Level 3 – TT 320; Vibrating Confetti SE 321/SJ 16; Vibrating Strings TE 321/SJ 18 Level 5 – EAL 374, EAL 381
		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	Level 3 – ATBD Level 5 – ATBD
		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	Level 3 – ATBD Level 5 – ATBD

2015 ELEMENTARY SCIENCE — PHYSICAL SCIENCES CONTINUED

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION	INQUIRY ACTIVITIES
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	Level 6 – Atomic Models SE 402/SJ 38; Molecular Models SE 420/SJ 50; Chemical Formula of a Molecule TE 420/SJ 54, EAL 422 Level 8 – Let's Join Up SE 477/SJ 65; Investigate Ionic Bonds SE 481/SJ 66; Model of Calcium Chloride TE 481/SJ 68, EAL 482; Build Models of Molecules SE 488/SJ 70; Build Large Molecules TE 488/SJ 72; Build and Name Ionic Compounds SE 495/SJ 78; Build Diatomic Models TE 495/SJ 80, EAL 499
		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	Level 6 – Reactions in a Bag SE 381/SJ 16, EAL 382, EAL 386; Pondering Plaster SE 388/SJ 20, EAL 389, EAL 391; Degrees of Change TE 391/SJ 24, EAL 393; Copper Coat a Nail Level 8 – Cabbage Chemistry SE 423/SJ 18; Let's Join Up SE 477/SJ 65; How Do You Know SE 505/SJ 91, EAL 507; Making Changes SE 509/SJ 92; Testing Powders TE 509/SJ 94; Investigating Chemical Reactions SE 510/SJ 96, EAL 512, EAL 513; Where Did It Go SE 519/SJ 100, EAL 522, EAL 524
		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	Level 6 – Nail File or Emory Board SE 249/SJ 18; Building Rocks TE 249/SJ 20; ATBD Level 8 – Resource Tally SE 323/SJ 43; Evaluating Biofuels SE 328/SJ 44; Alternative Biofuels TE 328/SJ 46; Fertilizer Contest TE 336/SJ 48
		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	Level 6 – Dissolving Sugar SE 372/SJ 12, EAL 374 Level 7 – Heat Experiment SE 513/SJ 93; Heat and Temperature SE 540/SJ 107; Comparing Conduction TE 540/SJ 108, EAL 543, EAL 546, EAL 548, EAL 555 Level 8 – EAL 410, EAL 527
		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	Level 6 – Reaction in a Bag SE 381/SJ 16, EAL 382, EAL 386 Level 8 – Where Did It Go SE 519/SJ 100; Conserving Mass TE 519/SJ 102
		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	Level 8 – Let's Join Up SE 477/SJ 65, EAL 513; ATBD
	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	Level 7 – Collisions TE 453/SJ 48; ATBD
		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	Level 7 – Accelerated Motion SE 449/SJ 42; Comparing Accelerated Motion TE 449; Collisions TE 453/SJ 48, EAL 454, EAL 458
		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	Level 6 – Creating Magnets SE 482/SJ 108; Generating Electric Current SE 490/SJ 114; Different Magnets TE 490/SJ 116, EAL 492, Making a Generator SE 497/SJ 118; Using Electric Current TE 497/SJ 120, EAL 500
		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	Level 7 – How Much Do You Weigh SE 291/SJ 7; Planetary Orbits TE 295/SJ 8, EAL 332; The Tides SE 348/SJ 40; Extreme Tides TE 348/SJ 42
		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	Level 6 – Electrostatic Discharge SE 437/SJ 73, LA 438; Taking Charge SE 440/SJ 74; Distance and Strength TE 440/SJ 76; Creating Magnets SE 482/SJ 108, EAL 483, EAL 489; Generating Electric Current SE 490/SJ 114; Different Magnets TE 490/SJ 116, EAL 492; Making a Generator SE 497/SJ 114; Using Electric Current TE 497/SJ 120, EAL 500 Level 7 – EAL p461, EAL p462, EAL p472

2015 ELEMENTARY SCIENCE — PHYSICAL SCIENCES CONTINUED

GRADE	TOPICS	STANDARDS (NGSS ALIGNMENT)	BY DESIGN CHAPTER CORRELATION	INQUIRY ACTIVITIES
6-8	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	Level 7 – Accelerated Motion SE 449/SJ 42; Comparing Accelerated Motion TE 449/ SJ 46; Collisions TE 453/ SJ 48, EAL 516; Swinging Pendulum TE 518/SJ 94, EAL 519, Investigating Potential Energy SE 520/SJ 98, EAL 526
		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	Level 6 – Electrostatic Discharge SE 437/ SJ 73; Taking Charge SE 440/SJ 174; Distance and Strength TE 440/ SJ 176; Creating Magnets SE 482/SJ 108, EAL 483, EAL 489 Level 7 – EAL 461, EAL 462; Swinging Pendulum TE 518/SJ 94; Investigating Potential Energy SE 520/SJ 98, EAL 526
		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	Level 7 – Heat Experiment SE 523/SJ 93; Comparing Conduction TE 540/SJ 108, EAL 541, EALp543; Cold Stuff SE 554/SJ 110, EAL 555
		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	Level 7 – Heat Experiment SE 513/SJ 93, EAL 538, EAL 543, EAL 546; Cold Stuff SE 554/SJ 110; Cool Down, or Warm Up TE 554/SJ 112
		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	Level 7 – Collisions SE 453/SJ 48, EAL 465, EAL 516, EAL 519; Investigating Potential Energy SE 520/SJ 98, EAL 526, EAL 532
	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	Level 7 – Make Waves SE 398/SJ 9, EAL 399, EAL 406; Gluba SE 407/SJ 12, EAL 411
		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	Level 7 – EAL 410, EAL 411, EAL 420, EAL 421, EAL 424, EAL 425; Creating Interference SE 427/SJ 20; Creating More Interference TE 427/SJ 22; Blending Colors TE 429/SJ 24
		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	Level 7 – ATBD