Wisconsin Science

Grades 3, 4, 5

Adopted 2017

Life Science

LS1. Students use science and engineering practices, crosscutting concepts, and an understanding of structures and processes (on a scale from molecules to organisms) to make sense of phenomena and solve problems. SCI.LS1

A. Structure and Function SCI.LS1.A

4. Plants and animals have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction. SCI.LS1.A.4

B. Growth and Development of Organisms SCI.LS1.B

3. Reproduction is essential to every kind of organism. Organisms have unique and diverse life cycles. SCI.LS1.B.3

C. Organization for Matter and Energy Flow in Organisms SCI.LS1.C

5. Food provides animals with the materials and energy they need for body repair, growth, warmth, and motion. Plants acquire material for growth chiefly from air, water, and process matter, and obtain energy from sunlight, which is used to maintain conditions necessary for survival. SCI.LS1.C.5

D. Information Processing SCI.LS1.D

4. Different sense receptors are specialized for particular kinds of information; animals use their perceptions and memories to guide their actions. SCI.LS1.D.4

LS2. **Students use science and engineering practices, crosscutting concepts, and an understanding of the interactions, energy, and dynamics within ecosystems to make sense of phenomena and solve problems.** SCI.LS2

A. Interdependent Relationships in Ecosystems SCI.LS2.A

5. The food of almost any animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants, while decomposers restore some materials back to the soil. SCI.LS2.A.5

B. Cycles of Matter and Energy Transfer in Ecosystems SCI.LS2.B

5. Matter cycles between the air and soil and among organisms as they live and die. SCI.LS2.B.5

C. Ecosystem Dynamics, Functioning, and Resilience SCI.LS2.C

3. When the environment changes, some organisms survive and reproduce, some move to new locations, some move into transformed environments, and some die. SCI.LS2.C.3

D. Social Interactions and Group Behavior SCI.LS2.D

3. Being part of a group helps animals obtain food, defend themselves, and cope with changes. SCI.LS2.D.3

LS3. **Students use science and engineering practices, crosscutting concepts, and an understanding of heredity to make sense of phenomena and solve problems.** SCI.LS3

A. Inheritance of Traits SCI.LS3.A

3. Many characteristics of organisms are inherited from their parents. Other characteristics result from individuals' interactions with the environment. Many characteristics involve both inheritance and environment. SCI.LS3.A.3

B. Variation of Traits SCI.LS3.B

3. Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops. SCI.LS3.B.3

LS4. **Students use science and engineering practices, cross-cutting concepts, and an understanding of biological evolution to make sense of phenomena and solve problems.** SCI.LS4

A. Evidence of Common Ancestry and Diversity SCI.LS4.A

3. Some living organisms resemble organisms that once lived on Earth. Fossils provide evidence about the types of organisms and environments that existed long ago. SCI.LS4.A.3

B. Natural Selection SCI.LS4.B

3. Differences in characteristics between individuals of the same species provide advantages in surviving and reproducing. SCI.LS4.B.3

C. Adaptation SCI.LS4.C

3. Particular organisms can only survive in particular environments. SCI.LS4.C.3

D. Biodiversity and Humans SCI.LS4.D

3. Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there. SCI.LS4.D.3

Physical Science

PS1. **Students use science and engineering practices, crosscutting concepts, and an understanding of matter and its interactions to make sense of phenomena and solve problems.** SCI.PS1

A. Structures and Properties of Matter SCI.PS1.A

5. Matter exists as particles that are too small to see. Matter is always conserved even if it seems to disappear. Measurements of a variety of observable properties can be used to identify particular materials. SCI.PS1.A.5

B. Chemical Reactions SCI.PS1.B

5. Chemical reactions that occur when substances are mixed can be identified by the emergence of substances with different properties. In chemical reactions the total mass remains the same. SCI.PS1.B.5

PS2. **Students use science and engineering practices, crosscutting concepts, and an understanding of forces, interactions, motion and stability to make sense of phenomena and solve problems.** SCI.PS2

A. Forces and Motion SCI.PS2.A

3. Qualities of motion and changes in motion require description of both size and direction. SCI.PS2.A.3

a. The effect of unbalanced forces on an object results in a change of motion. SCI.PS2.A.3.A

b. Patterns of motion can be used to predict future motion. SCI.PS2.A.3.B

B. Types of Interactions SCI.PS2.B

3. Some forces act through contact, some forces (e.g. magnetic, electrostatic) act even when the objects are not in contact. SCI.PS2.B.3

5. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. SCI.PS2.B.5

PS3. **Students use science and engineering practices, cross-cutting concepts, and an understanding of energy to make sense of phenomena and solve problems.** SCI.PS3

A. Definitions of Energy SCI.PS3.A

4. Moving objects contain energy. The faster the object moves, the more energy it has. SCI.PS3.A.4

B. Conservation of Energy and Energy Transfer SCI.PS3.B

4. Energy can be moved from place to place by moving objects, or through sound, light, or electrical currents. Energy can be converted from one form to another form. SCI.PS3.B.4

C. Relationships Between Energy and Forces SCI.PS3.C

4. When objects collide, contact forces transfer energy so as to change objects' motions. SCI.PS3.C.4

D. Energy in Chemical Processes and Everyday Life SCI.PS3.D

4,5. Plants capture energy from sunlight which can be used as fuel or food. SCI.PS3.D.4,5

a. Stored energy in food or fuel can be converted to useable energy. SCI.PS3.D.4,5.A

PS4. **Students use science and engineering practices, cross-cutting concepts, and an understanding of waves and their applications in technologies for information transfer to make sense of phenomena and solve problems.** SCI.PS4

A. Wave Properties SCI.PS4.A

4. Waves are regular patterns of motion, which can be made in water by disturbing the surface. Waves of the same type can differ in amplitude and wavelength. Waves can make objects move. SCI.PS4.A.4

B. Electromagnetic Radiation SCI.PS4.B

4. Objects can be seen when light reflected from their surface enters our eyes. SCI.PS4.B.4

C. Information Technologies and Instrumentation SCI.PS4.C

4. Patterns can encode, send, receive, and decode information. SCI.PS4.C.4

Earth and Space Science

ESS1. **Students use science and engineering practices, cross-cutting concepts, and an understanding of Earth's place in the universe to make sense of phenomena and solve problems.** SCI.ESS1

A. The Universe and Its Stars SCI.ESS1.A

5. Stars range greatly in size and distance from Earth, and this can explain their relative brightness. SCI.ESS1.A.5

B. Earth and the Solar System SCI.ESS1.B

5. The Earth's orbit and rotation, and the orbit of the moon around the Earth cause observable patterns. SCI.ESS1.B.5

C. The History of Planet Earth SCI.ESS1.C

4. Certain features on Earth can be used to order events that have occurred in a landscape. SCI.ESS1.C.4

ESS2. Students use science and engineering practices, crosscutting concepts, and an understanding of Earth's systems to make sense of phenomena and solve problems. SCI.ESS2

A. Earth Materials and Systems SCI.ESS2.A

4,5. Four major Earth systems interact. Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, organisms, and gravity break rocks, soils, and sediments into smaller pieces and move them around. SCI.ESS2.A.4,5

B. Plate Tectonics and Large-Scale System Interactions SCI.ESS2.B

4. Earth's physical features occur in patterns, as do earthquakes and volcanoes. Maps can be used to locate features and determine patterns in those events. SCI.ESS2.B.4

C. The Roles of Water in Earth's Surface Processes SCI.ESS2.C

5. Most of Earth's water is in the ocean, and much of the Earth's freshwater is in glaciers or underground. SCI.ESS2.C.5

D. Weather and Climate SCI.ESS2.D

3. Climate describes patterns of typical weather conditions over different scales and variations. Historical weather patterns can be analyzed. SCI.ESS2.D.3

E. Biogeology SCI.ESS2.E

4. Living things can affect the physical characteristics of their environment. SCI.ESS2.E.4

ESS3. Students use science and engineering practices, crosscutting concepts, and an understanding of the Earth and human activity to make sense of phenomena and solve problems. SCI.ESS3

A. Natural Resources SCI.ESS3.A

4. Energy and fuels humans use are derived from natural sources, and their use affects the environment. Some resources are renewable over time, others are not. SCI.ESS3.A.4

B. Natural Hazards SCI.ESS3.B

3,4. A variety of hazards result from natural processes; humans cannot eliminate hazards but can reduce their impacts. SCI.ESS3.B.3,4

C. Human Impacts on Earth Systems SCI.ESS3.C

5. Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Societal activities can also help protect Earth's resources and environments. SCI.ESS3.C.5

Engineering, Technology, and the Application of Science (ETS)

ETS1. Students use science and engineering practices, cross-cutting concepts, and an understanding of engineering design to make sense of phenomena and solve problems. SCI.ETS1

A. Defining and Delimiting Engineering Problems SCI.ETS1.A

3-5. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. SCI.ETS1.A.3-5

B. Developing Possible Solutions SCI.ETS1.B

3-5. Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. SCI.ETS1.B.3-5

a. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. SCI.ETS1.B.3-5.A

b. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. SCI.ETS1.B.3-5.B

C. Optimizing the Design Solution SCI.ETS1.C

4. Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. SCI.ESS1.C.4

ETS2. Students use science and engineering practices, crosscutting concepts, and an understanding of the links among Engineering, Technology, Science, and Society to make sense of phenomena and solve problems. SCI.ETS2

A. Interdependence of Science, Engineering, and Technology SCI.ETS2.A

3-5. Science and technology support each other. SCI.ETS2.A.3-5

a. Tools and instruments are used to answer scientific questions, while scientific discoveries lead to the development of new technologies. SCI.ETS2.A.3-5.A

B. Influence of Engineering, Technology, and Science on Society and the Natural World SCI.ETS2.B

3-5. People's needs and wants change over time, as do their demands for new and improved technologies. SCI.ETS2.B.3-5

a. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. SCI.ETS2.B.3-5.A

b. When new technologies become available, they can bring about changes in the way people live and interact with one another. SCI.ETS2.B.3-5.B

ETS3. Students use science and engineering practices, cross-cutting concepts, and an understanding of the nature of science and engineering to make sense of phenomena and solve problems. SCI.ETS3

A. Science and Engineering Are Human Endeavors SCI.ETS3.A

3-5. Science and engineering knowledge have been created by many cultures. SCI.ETS3.A.3-5

a. People use the tools and practices of science and engineering in many different situations (e.g. land managers, technicians, nurses and welders). SCI.ETS3.A.3-5.A

b. Science and engineering affect everyday life. SCI.ETS3.A.3-5.B

B. Science and Engineering Are Unique Ways of Thinking with Different Purposes SCI.ETS3.B

3-5. Science and engineering are both bodies of knowledge and processes that add new knowledge to our understanding. SCI.ETS3.B.3-5

a. Scientific findings are limited to what can be supported with evidence from the natural world. Basic laws of nature are the same everywhere in the universe (e.g. gravity, conservation of matter, energy transfer, etc.). SCI.ETS3.B.3-5.A

b. Engineering solutions often have drawbacks as well as benefits. SCI.ETS3.B.3-5.B

C. Science and Engineering Use Multiple Approaches to Create New Knowledge and Solve Problems SCI.ETS3.C

3-5. The products of science and engineering are not developed through one set "scientific method" or "engineering design process." Instead, they use a variety of approaches described in the Science and Engineering Practices. SCI.ETS3.C.3-5

a. Science explanations are based on a body of evidence and multiple tests, and describe the mechanisms for natural events. Science explanations can change based on new evidence. SCI.ETS3.C.3-5.A

b. There is no perfect design in engineering. Designs that are best in some ways (e.g. safety or ease of use) may be inferior in other ways (e.g. cost or aesthetics). SCI.ETS3.C.3-5.B

Science and Engineering Practices

SEP1. Students ask questions and define problems, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems. SCI.SEP1

A. Asking Questions SCI.SEP1.A

3-5. Students ask questions that specify qualitative relationships. This includes the following: SCI.SEP1.A.3-5

a. Ask questions about what would happen if a variable is changed. SCI.SEP1.A.3-5.A

b. Identify scientific (testable) and non-scientific (non-testable) questions. SCI.SEP1.A.3-5.B

c. Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. SCI.SEP1.A.3-5.C

B. Defining Problems SCI.SEP1.B

3-5. Students use prior knowledge to describe and define simple design problems that can be solved through the development of an object, tool, process, or system. They include several criteria for success and constraints on materials, time, or cost. SCI.SEP1.B.3-5

SEP2. Students develop and use models, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems. SCI.SEP2

A. Developing Models SCI.SEP2.A

3-5. Students build and revise simple models and use models to represent events and design solutions. This includes the following: SCI.SEP2.A.3-5

a. Identify limitations of models. SCI.SEP2.A.3-5.A

b. Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. SCI.SEP2.A.3-5.B

c. Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. SCI.SEP2.A.3-5.C

d. Develop and/or use models to describe or predict phenomena. SCI.SEP2.A.3-5.D

e. Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. SCI.SEP2.A.3-5.E

f. Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system. SCI.SEP2.A.3-5.F

SEP3. Students plan and carry out investigations, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems. SCI.SEP3

A. Planning and Conducting Investigations SCI.SEP3.A

3-5. Students plan and carry out investigations that control variables and provide evidence to support explanations or design solutions. This includes the following: SCI.SEP3.A.3-5

a. Collaboratively plan and conduct an investigation to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. SCI.SEP3.A.3-5.A

b. Evaluate appropriate methods and tools for collecting data. SCI.SEP3.A.3-5.B

c. Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. SCI.SEP3.A.3-5.C

d. Make predictions about what would happen if a variable changes. SCI.SEP3.A.3-5.D

e. Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success. SCI.SEP3.A.3-5.E

SEP4. Students analyze and interpret data, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems. SCI.SEP4

A. Analyze and Interpret Data SCI.SEP4.A

3-5. Students begin to use quantitative approaches to collect data and conduct multiple trials of qualitative observations. (When possible, digital tools should be used.) This includes the following: SCI.SEP4.A.3-5

a. Represent data in tables or various graphical displays (bar graphs, pictographs, and pie charts) to reveal patterns that indicate relationships. SCI.SEP4.A.3-5.A

b. Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, or computation. SCI.SEP4.A.3-5.B

c. Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings. SCI.SEP4.A.3-5.C

d. Analyze data to refine a problem statement or the design of a proposed object, tool, or process. SCI.SEP4.A.3-5.D

e. Use data to evaluate and refine design solutions. SCI.SEP4.A.3-5.E

SEP5. Students use mathematics and computational thinking, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems. SCI.SEP5

A. Qualitative and Quantitative Data SCI.SEP5.A

3-5. Students extend quantitative measurements to a variety of physical properties, using computation and mathematics to analyze data and compare alternative design solutions. This includes the following: SCI.SEP5.A.3-5

a. Organize simple data sets to reveal patterns that suggest relationships. SCI.SEP5.A.3-5.A

b. Describe, measure, estimate, and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems. SCI.SEP5.A.3-5.B

c. Create and use graphs or charts generated from simple algorithms to compare alternative solutions to an engineering problem. SCI.SEP5.A.3-5.C

SEP6. Students construct explanations and design solutions, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems. SCI.SEP6

A. Construct an Explanation SCI.SEP6.A

3-5. Students use evidence to construct explanations that specify variables which describe and predict phenomena. This includes the following: SCI.SEP6.A.3-5

a. Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard). SCI.SEP6.A.3-5.A

b. Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation. SCI.SEP6.A.3-5.B

c. Identify the evidence that supports particular points in an explanation. SCI.SEP6.A.3-5.C

B. Design Solutions SCI.SEP6.B

3-5. Students use evidence to create multiple solutions to design problems. This includes the following: SCI.SEP6.B.3-5

a. Apply scientific ideas to solve design problems. SCI.SEP6.B.3-5.A

b. Generate multiple solutions to a problem and compare how well they meet the criteria and constraints. SCI.SEP6.B.3-5.B

SEP7. Students engage in argument from evidence, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems. SCI.SEP7

A. Argue from Evidence SCI.SEP7.A

3-5. Students critique the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world. This includes the following: SCI.SEP7.A.3-5

a. Compare and refine arguments based on an evaluation of the evidence presented. SCI.SEP7.A.3-5.A

b. Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation. SCI.SEP7.A.3-5.B

c. Respectfully provide and receive critiques from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions. SCI.SEP7.A.3-5.C

d. Construct and/or support an argument with evidence, data, or a model. SCI.SEP7.A.3-5.D

e. Use data to evaluate claims about cause and effect. Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. SCI.SEP7.A.3-5.E

f. Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. SCI.SEP7.A.3-5.F

SEP8. **Students will obtain, evaluate and communicate information, in conjunction with using crosscutting concepts and disciplinary core ideas, to make sense of phenomena and solve problems.** SCI.SEP8

A. Obtain, Evaluate, and Communicate Information SCI.SEP8.A

3-5. Students evaluate the merit and accuracy of ideas and methods. This includes the following: SCI.SEP8.A.3-5

a. Read and comprehend grade-appropriate complex texts and other reliable media to summarize and obtain scientific and technical ideas, and describe how they are supported by evidence. SCI.SEP8.A.3-5.A

b. Compare and/or combine information across complex texts and other reliable media to support the engagement in scientific and engineering practices. SCI.SEP8.A.3-5.B

c. Combine information in written text with that contained in corresponding tables, diagrams, or charts to support the engagement in other scientific and engineering practices. SCI.SEP8.A.3-5.C

d. Obtain and combine information from books or other reliable media to explain phenomena or solutions to a design problem. SCI.SEP8.A.3-5.D

e. Communicate scientific and technical information orally or in written formats, including various forms of media, which may include tables, diagrams, and charts. SCI.SEP8.A.3-5.E

Cross Cutting Concepts

CC1. **Students use science and engineering practices, disciplinary core ideas, and patterns to make sense of phenomena and solve problem** SCI.CC1

3-5. Students identify similarities and differences in order to sort and classify natural objects and designed products. They identify patterns related to time, including simple rates of change and cycles, and use these patterns to make predictions. SCI.CC1.3-5

CC2. **Students use science and engineering practices, disciplinary core ideas, and cause and effect relationships to make sense of phenomena and solve problems.** SCI.CC2

3-5. Students routinely identify and test causal relationships and use these relationships to explain change. They understand events that occur together with regularity may or may not signify a cause and effect relationship. SCI.CC2.3-5

CC3. **Students use science and engineering practices, disciplinary core ideas, and an understanding of scale, proportion and quantity to make sense of phenomena and solve problems.** SCI.CC3

3-5. Students recognize natural objects and observable phenomena exist from the very small to the immensely large. They use standard units to measure and describe physical quantities such as mass, time, temperature, and volume. SCI.CC3.3-5

CC4. **Students use science and engineering practices, disciplinary core ideas, and an understanding of systems and models to make sense of phenomena and solve problems.** SCI.CC4

3-5. Students understand a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. They also describe a system in terms of its components and their interactions. SCI.CC4.3-5

CC5. **Students use science and engineering practices, disciplinary core ideas, and an understanding of energy and matter to make sense of phenomena and solve problems.** SCI.CC5

3-5. Students understand matter is made of particles and energy can be transferred in various ways and between objects. Students observe the conservation of matter by tracking matter flows and cycles before and after processes, recognizing the total mass of substances does not change. SCI.CC5.3-5

CC6. **Students use science and engineering practices, disciplinary core ideas, and an understanding of structure and function to make sense of phenomena and solve problems.** SCI.CC6

3-5. Students understand different materials have different substructures, which can sometimes be observed; and substructures have shapes and parts that serve functions. SCI.CC6.3-5

CC7. **Students use science and engineering practices, disciplinary core ideas, and an understanding of stability and change to make sense of phenomena and solve problems.** SCI.CC7

3-5. Students measure change in terms of differences over time, and observe that change may occur at different rates. They understand some systems appear stable, but over long periods of time they will eventually change. SCI.CC7.3-5