

2016 WYOMING SCIENCE

CONTENT AND PERFORMANCE STANDARDS

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2016 WYOMING SCIENCE CONTENT AND PERFORMANCE STANDARDS

INTRODUCTION

The Wyoming Science Content and Performance Standards (WyCPS) were last reviewed and approved in 2008 in accordance with Wyoming state statute W.S. 21-2-304(c). The 2016 Wyoming Content and Performance Standards were developed collaboratively through the contributions of Science Standard Review Committee (SSRC) members from across the state. The committee's work was informed and guided by initial public input through community forums, as well as input solicited from specific stakeholder groups.

INTRODUCTION TO STANDARDS

Content Standards: Content standards define what students are expected to know and be able to do by the time they graduate. They do not dictate what methodology or instructional materials should be used, nor how the material is delivered.

Benchmarks: Benchmarks (also called performance expectations in this document) specify what students are expected to know and be able to do at the end of each of the benchmark grade levels. These benchmarks specify the skills and content students must master along the way in order to demonstrate proficiency of the content standard by the time they graduate. In this standards document, you will find these are broken out into individual grades for Kindergarten through 5th grade and then banded by grade bands for middle school/junior high school and high school grade levels (6-8 and 9-12).

RATIONALE

Today, quality science education enables students to learn science by being actively involved with scientific and engineering practices as they progress from kindergarten through 12th grade. They are encouraged to be inquisitive, to actively explore their environment, and become productive, scientifically literate citizens. The standards we present here provide the necessary foundation for local school district decisions about curriculum, assessments, and instruction. Implementation of the new standards will better prepare Wyoming high school graduates for the rigors of college and/or careers. In turn, Wyoming employers will be able to hire workers with a strong science and engineering base — both in specific content areas and in critical thinking and inquiry-based problem solving.

The Wyoming Science Content and Performance Standards support that:

- all students can engage in sophisticated science and engineering practices.
- students must have the opportunity to conduct investigations, solve problems, and engage in discussions.
- students learn through relevant context and use modeling to explain observed phenomena.
- students move beyond facts and terminology to develop explanations and design solutions supported by evidence-based arguments and reasoning.
- students discuss open-ended questions that focus on the strength of the evidence used to generate claims.
- students develop summaries of information through multiple sources, including science-related magazine and journal articles and web-based resources.
- students develop questions that drive multiple investigations with a range of possible outcomes that collectively lead to a deep understanding of established core scientific ideas.
- students write reports, create posters, and design media presentations that explain and add credibility to their argument.
- students develop a better understanding of the science they are researching by accessing professional scientists and engineers through various means.
- students communicate and defend their research to an authentic audience such as at colloquiums with secondary students.

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ORGANIZATION OF STANDARDS

These standards were informed by *A Framework for K-12 Science Education* (National Research Council, 2012), the Next Generation Science Standards (National Academies Press, 2013), and the unique needs of Wyoming. They are distinct from prior science standards in that they integrate three dimensions of learning within each standard and have intentional connections across standards, grade bands, and subjects. The three dimensions are crosscutting concepts, disciplinary core ideas, and science and engineering practices.

Dimension 1: Crosscutting Concepts (CCC)

The seven crosscutting concepts have application across all domains of science. As such, they provide one way of linking across the domains of the Disciplinary Core Ideas.

Dimension 2: Disciplinary Core Ideas (DCI)

The continuing expansion of scientific knowledge makes it impossible to teach all of the ideas related to a given discipline in exhaustive detail during the K-12 years. But given the cornucopia of information available today, virtually at a touch, an important role of science education is not to teach “all the facts” but rather to prepare students in the four domains of science with sufficient core knowledge so that they can later acquire additional information on their own. The four domains referenced are: 1) physical science, 2) life science, 3) earth and space science, and 4) engineering, technology and applications of science.

Dimension 3: Science and Engineering Practices (SEP)

The SEPs describe (a) the major practices that scientists employ as they investigate and build models and theories about the world, and (b) a key

set of engineering practices that engineers use as they design and build systems. We use the term “practices” instead of skills to emphasize that engaging in a scientific investigation requires not only skill but also knowledge that is specific to each practice.

Cross-curricular connections to Wyoming Content and Performance Standards in English Language Arts (ELA), Mathematics, Social Studies (S.S.), Physical Education (P.E.), Health, Fine and Performing Arts (FPA), and Career and Vocational Education (CVE) are identified and referenced within the science standards. These are intended as suggestions for areas where other content standards can be integrated in the teacher’s instruction and lessons. The connection would be dependent on the curricula.

2016 Wyoming Science Standards

Physical Science	PS1 - Matter and Its Interactions							
	K	1	2	3	4	5	6-8	9-12
	PS2 - Motion and Stability: Forces and Interactions							
	K	1	2	3	4	5	6-8	9-12
	PS3 - Energy							
Life Science	PS4 - Waves and Their Applications in Technologies for Information Transfer							
	K	1	2	3	4	5	6-8	9-12
	LS1 - From Molecules to Organisms: Structure and Processes							
	K	1	2	3	4	5	6-8	9-12
	LS2 - Ecology: Interactions, Energy, and Dynamics							
Earth & Space	LS3 - Heredity: Inheritance and Variation of Traits							
	K	1	2	3	4	5	6-8	9-12
	LS4 - Biological Evolution: Unity and Diversity							
	K	1	2	3	4	5	6-8	9-12
	ESS1 - Earth's Place in the Universe							
ETS	ESS2 - Earth's Systems							
	K	1	2	3	4	5	6-8	9-12
	ESS3 - Earth and Human Activity							
ETS	ETS - Engineering, Technology, and Applications of Science							
	K	1	2	3	4	5	6-8	9-12

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On the next page you will find how to read this document and understand its many components.

WYOMING CROSS-CURRICULAR CONNECTIONS

At the bottom of each standards page, you will find where these science standards tie in with other content areas, such as the following:

- ELA
- Mathematics
- Social Studies
- Health
- Physical Education
- Career & Vocational Education
- Fine & Performing Arts

These standards can be found on the WDE website at
<http://edu.wyoming.gov/educators/standards>

INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION (ISTE) CONNECTIONS

The Committee suggests educators use the following ISTE standards in their science curriculum, instruction, and activities, where appropriate. Standard 3 has been identified throughout the document, however others may apply depending on the curriculum used.

[2007 ISTE Standards for Students](#)

1. Creativity and innovation
2. Communication and collaboration
3. Research and information fluency
4. Critical thinking, problem solving, and decision making
5. Digital citizenship
6. Technology operations and concepts

RESOURCES / REFERENCES

National Research Council [NRC]. (2012). [A Framework for K-12 Science Education](#): Practices, Crosscutting Concepts, and Core Ideas. Washington, DC: The National Academies Press.

NGSS Lead States (2013). [Next Generation Science Standards: For States, By States](#). Washington, DC: National Academies Press.

National Research Council. (2015). [Guide to Implementing the Next Generation Science Standards](#) (pp. 8-9). Washington, DC: National Academies Press.

How to Read This Document

Earth's Place in the Universe [4-ESS1-1]

Grade Level

Performance Expectations (PE) are the benchmarks; the skills and content students should master.

Clarification Statements provide further explanation or examples to support educators.

The State Assessment Boundary is to be considered when developing classroom and district assessments and gives limitations to the state assessment.

Symbol denotes WY examples are given or can be considered in instruction



Performance Expectations (Benchmark)

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

Clarification Statement: Examples of evidence from patterns (may include, but not limited to, Wyoming specific examples) could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom indicating that over time a river cut through the rock.

State Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.

Three Dimensions of Learning

Crosscutting Concepts	Patterns can be used as evidence to support an explanation.
Disciplinary Core Ideas	The History of Planet Earth: <ul style="list-style-type: none"> Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.
Science & Engineering Practices	Constructing explanations and designing solutions in 3-5 builds on K-2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. <ul style="list-style-type: none"> Identify the evidence that supports particular points in an explanation.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Mathematics Connections
<p>W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.</p> <p>W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p> <p>W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.</p>	<p>SS5.5.2 Explain how physical features, patterns, and systems impact different regions and how these features may help us generalize and compare areas within the state, nation, or world.</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.</p>

Science Standard Code [4.ESS1-1] means Grade 4, Earth & Space Science, Standard 1, Benchmark 1

Crosscutting Concepts (CCC) represent themes that span across engineering and science disciplines.

Disciplinary Core Ideas (DCI) represent a set of ideas for K-12 science education.

Science & Engineering Practices (SEP) will help students develop problem solving skills and understand their world through investigation.

Wyoming Cross-Curricular Connections identify possible connections to other WY Content & Performance Standards. These are intended to be suggestions and may be relevant depending on curriculum and instruction.

2016 WYOMING SCIENCE CONTENT AND PERFORMANCE STANDARDS

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Elementary Standards

Students in kindergarten through fifth grade begin to develop an understanding of the four **disciplinary core ideas**: physical sciences; life sciences; earth and space sciences; and engineering, technology, and applications of science. In the earlier grades, students begin by recognizing patterns and formulating answers to questions about the world around them. By the end of fifth grade, students are able to demonstrate grade-appropriate proficiency in gathering, describing, and using information about the natural and designed world(s). The performance expectations in elementary school grade bands develop ideas and skills that will allow students to explain increasingly complex phenomena in the four disciplines as they progress to middle school and high school. The performance expectations shown in kindergarten through fifth grade couple particular practices and **crosscutting concepts** with specific **disciplinary core ideas**. However, instructional decisions should include use of additional practices and **crosscutting concepts** that lead to the performance expectations.

First Grade



First grade performance expectations include **PS4, LS1, LS3, and ESS1 Disciplinary Core Ideas** adapted from the NRC Framework. The performance expectations in first grade help students formulate answers to questions such as: “What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?” The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light. Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky.

The **Crosscutting Concepts** and Connections to Engineering, Technology, and Applications of Science, listed below, are the organizing concepts for these **Disciplinary Core Ideas**.

Crosscutting Concepts

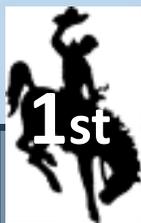
- Patterns
- Cause and effect
- Scale, proportion, and quantity
- Systems and system models
- Energy and matter
- Structure and function
- Stability and change

Connections to Engineering, Technology, and Applications of Science

- Interdependence of science, engineering, and technology
- Influence of science, engineering, and technology on society and the natural world

In the first grade performance expectations, students are expected to demonstrate understanding of the **core ideas** and grade appropriate proficiency in using the **Science and Engineering Practices** below:

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



Waves & Their Application in Technologies for Information Transfer [1-PS4-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</p> <p><i>Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.</i></p>	Crosscutting Concepts	Simple tests can be designed to gather evidence to support or refute student ideas about causes.
	Disciplinary Core Ideas	Wave Properties: <ul style="list-style-type: none"> • Sound can make matter vibrate, and vibrating matter can make sound.
	Science & Engineering Practices	Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. <ul style="list-style-type: none"> • Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Fine & Performing Arts Connections	Mathematics Connections
<p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.</p>	<p>FPA4.1.M.4 Students create music using a variety of traditional and nontraditional sound sources.</p>	<p>N/A</p>



Waves & Their Application in Technologies for Information Transfer [1-PS4-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-PS4-2. Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.</p> <p><i>Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.</i></p>	Crosscutting Concepts	Simple tests can be designed to gather evidence to support or refute student ideas about causes.
	Disciplinary Core Ideas	Electromagnetic Radiation: <ul style="list-style-type: none"> Objects can be seen if light is available to illuminate them or if they give off their own light.
	Science & Engineering Practices	Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections		Mathematics Connections
<p>W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.</p> <p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.</p>		<p>N/A</p>

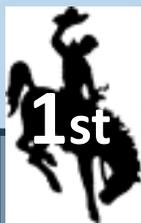


Waves & Their Application in Technologies for Information Transfer [1-PS4-3]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-PS4-3. Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.</p> <p><i>Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).</i></p> <p><i>State Assessment Boundary: Assessment does not include the speed of light.</i></p>	Crosscutting Concepts	Simple tests can be designed to gather evidence to support or refute student ideas about causes.
	Disciplinary Core Ideas	<p>Electromagnetic Radiation:</p> <ul style="list-style-type: none"> Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.)
	Science & Engineering Practices	<p>Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</p> <ul style="list-style-type: none"> Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections		Mathematics Connections
<p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p> <p>SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.</p>		N/A



Waves & Their Application in Technologies for Information Transfer [1-PS4-4]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.</p> <p>Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones”, and a pattern of drum beats.</p> <p>State Assessment Boundary: Assessment does not include technological details for how communication devices work.</p> <p>Engineering, Technology & Application of Science Connections K-2-ETS1-1 (pg. 32) K-2-ETS1-2 (pg. 33)</p>	Crosscutting Concepts	People depend on various technologies in their lives; human life would be very different without technology.
	Disciplinary Core Ideas	<p>Information Technologies and Instrumentation:</p> <ul style="list-style-type: none"> • People also use a variety of devices to communicate (send and receive information) over long distances. <p>Defining and Delimiting Engineering Problems:</p> <ul style="list-style-type: none"> • 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 prepared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. <p>Developing Possible Solutions:</p> <ul style="list-style-type: none"> • 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. • 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. • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
	Science & Engineering Practices	<p>Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</p> <ul style="list-style-type: none"> • Use tools and materials provided to design a device that solves a specific problem.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Fine & Performing Arts Connections	Mathematics Connections
<p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p>	<p>FPA4.1.A.2 Students investigate and apply a variety of materials, resources, technologies and processes to communicate experiences and ideas through art.</p> <p>FPA4.1.A.4 Students collaborate with others in creative artistic processes.</p> <p>FPA.4.1.A.5 Students use art materials and tools in a safe and responsible manner.</p> <p>FPA4.1.T.1 Students create and perform to express ideas through the use of movement, sound and language.</p>	<p>MP.5 Use appropriate tools strategically.</p> <p>1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.</p> <p>1.MD.A.2 Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.</p>



From Molecules to Organisms: Structures & Processes [1-LS1-1]

1st Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-LS1-1. 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.</p> <p><i>Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, pine cone scales, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.</i></p> <p>Engineering, Technology & Application of Science Connections K-2-ETS1-1 (pg. 32) K-2-ETS1-2 (pg. 33)</p> <p>ISTE-3. Students apply digital tools to gather, evaluate, and use information.</p>	Crosscutting Concepts	The shape and stability of structures of natural and designed objects are related to their function(s).
	Disciplinary Core Ideas	<p>Structure and Function:</p> <ul style="list-style-type: none"> All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. <p>Information Processing:</p> <ul style="list-style-type: none"> Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. <p>Defining and Delimiting Engineering Problems:</p> <ul style="list-style-type: none"> 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 prepared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. <p>Developing Possible Solutions:</p> <ul style="list-style-type: none"> 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. 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. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
	Science & Engineering Practices	<p>Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</p> <ul style="list-style-type: none"> Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Fine & Performing Arts Connections	Health Connections
<p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how to” books on a given topic and use them to write a sequence of instructions).</p>	<p>FPA4.1.A.2 Students investigate and apply a variety of materials, resources, technologies and processes to communicate experiences and ideas through art.</p> <p>FPA4.1.A.5 Students use art materials and tools in a safe and responsible manner.</p>	<p>HE2.3.4 Identify characteristics of effective listening skills to enhance health or reduce/avoid health risks (e.g., eyes on speaker, etc.). PCD, IP/S, FA.</p>

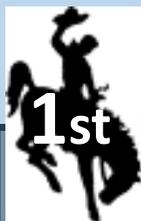


From Molecules to Organisms: Structures & Processes [1-LS1-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</p> <p>Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).</p> 	Crosscutting Concepts	Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.
	Disciplinary Core Ideas	Growth and Development of Organisms: <ul style="list-style-type: none"> • Adult plants and animals can have young. • In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.
	Science & Engineering Practices	Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. <ul style="list-style-type: none"> • Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Health Connections	Mathematics Connections
<p>RI.1.1 Ask and answer questions about key details in a text.</p> <p>RI.1.2 Identify the main topic and retell key details of a text.</p> <p>RI.1.10 With prompting and support read informational texts appropriately complex for grade.</p>	<p>HE2.3.1 Identify various methods to express individual health needs, wants, and feelings (e.g., visual, verbal, physical). PH, ME, FAM.</p> <p>HE2.3.4 Identify characteristics of effective listening skills to enhance health or reduce/avoid health risks (e.g., eyes on speaker, etc.). PCD, IP/S, FA</p>	<p>1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols $>$, $=$, and $<$.</p> <p>1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.</p> <p>1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.</p> <p>1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</p>

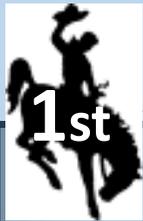


Heredity: Inheritance and Variation of Traits [1-LS3-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</p> <p><i>Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.</i></p> <p><i>State Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.</i></p>	Crosscutting Concepts	<p>Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.</p>
	Disciplinary Core Ideas	<p>Inheritance of Traits:</p> <ul style="list-style-type: none"> • Young animals are very much, but not exactly like, their parents. • Plants also are very much, but not exactly, like their parents. <p>Variation of Traits:</p> <ul style="list-style-type: none"> • Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.
	Science & Engineering Practices	<p>Constructing explanations (for science) and designing solutions (for engineering) in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.</p> <ul style="list-style-type: none"> • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections		Mathematics Connections
<p>RI.1.1 Ask and answer questions about key details in a text.</p> <p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p>		<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.</p>

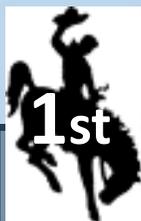


Earth's Place in the Universe [1-ESS1-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.</p> <p>Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.</p> <p>State Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.</p>	Crosscutting Concepts	Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.
	Disciplinary Core Ideas	The Universe and its Stars: <ul style="list-style-type: none"> Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.
	Science & Engineering Practices	Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. <ul style="list-style-type: none"> Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections		Mathematics Connections
<p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p>		<p>N/A</p>



Earth's Place in the Universe [1-ESS1-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.</p> <p>Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.</p> <p>State Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.</p>	Crosscutting Concepts	Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.
	Disciplinary Core Ideas	Earth and the Solar System: <ul style="list-style-type: none"> Seasonal patterns of sunrise and sunset can be observed, described, and predicted.
	Science & Engineering Practices	Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, which provide data to support explanations or design solutions. <ul style="list-style-type: none"> Make observations (firsthand or from media) to collect data that can be used to make comparisons.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections		Mathematics Connections
<p>W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions).</p> <p>W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.</p>		<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem.</p> <p>1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.</p>

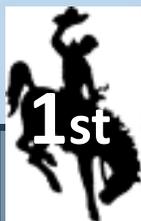


Engineering, Technology, & Applications of Science [K-2-ETS1-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p>Science Standards Connections 1-PS4-4 (pg. 26) 1-LS1-1 (pg. 27)</p>	Crosscutting Concepts	<i>Intentionally Left Blank</i>
	Disciplinary Core Ideas	<p>Defining and Delimiting Engineering Problems:</p> <ul style="list-style-type: none"> • A situation that people want to change or create can be approached as a problem to be solved through engineering. • Asking questions, making observations, and gathering information are helpful in thinking about problems. • Before beginning to design a solution, it is important to clearly understand the problem.
	Science & Engineering Practices	<p>Asking Questions and Defining Problems in K-2 builds on prior experiences and progresses to simple descriptive questions.</p> <ul style="list-style-type: none"> • Ask questions based on observations to find more information about the natural and/or designed world. • Define a simple problem that can be solved through the development of a new or improved object or tool.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Mathematics Connections
<p>RI.2.1 Ask and answer such questions as <i>who</i>, <i>what</i>, <i>where</i>, <i>when</i>, <i>why</i>, and <i>how</i> to demonstrate understanding of key details in a text.</p> <p>W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p>	<p>SS2.4.2 Identify tools and technologies that make life easier (e.g., cars for getting one place to another, washing machines for washing clothes, or flashlights to see in the dark).</p> <p>SS2.5.3 Use the human features of a community to describe what makes that community special (e.g., cultural, language, religion, food, clothing, political, economic, population, and types of jobs in the area) and why others want to move there or move away from there.</p> <p>SS2.5.4 Identify how people may adjust to and/or change their environment in order to survive (e.g., clothing, houses, foods, and natural resources).</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.</p>



Engineering, Technology, & Applications of Science [K-2-ETS1-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p> <p>Science Standards Connections 1-PS4-4 (pg. 26) 1-LS1-1 (pg. 27)</p>	<p>Crosscutting Concepts</p>	<p>Structure and Function:</p> <ul style="list-style-type: none"> The shape and stability of structures of natural and designed objects are related to their function(s).
	<p>Disciplinary Core Ideas</p>	<p>Developing Possible Solutions:</p> <ul style="list-style-type: none"> Designs can be conveyed through sketches, drawings, or physical models. The representations are useful in communicating ideas for a problem’s solutions to other people.
	<p>Science & Engineering Practices</p>	<p>Developing and Using Models in K-2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.</p> <ul style="list-style-type: none"> Develop a simple model based on evidence to represent a proposed object or tool.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Fine & Performing Arts Connections
<p>SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.</p>	<p>SS2.4.2 Identify tools and technologies that make life easier (e.g., cars for getting one place to another, washing machines for washing clothes, or flashlights to see in the dark).</p>	<p>FPA4.1.A.4 Students collaborate with others in creative artistic processes.</p> <p>FPA4.1.A.5 Students use art materials and tools in a safe and responsible manner.</p> <p>FPA4.1.A.6 Students complete and exhibit their artwork.</p>



Engineering, Technology, & Applications of Science [K-2-ETS1-3]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	Crosscutting Concepts	<i>Intentionally Left Blank</i>
	Disciplinary Core Ideas	Optimizing the Design Solution <ul style="list-style-type: none"> Because there is always more than one possible solution to a problem, it is useful to compare the test designs.
	Science & Engineering Practices	Analyzing and Interpreting Data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. <ul style="list-style-type: none"> Analyze data from tests of an object or tool to determine if it works as intended.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Mathematics Connections
<p>W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p>	<p>SS2.3.3 Identify how science or technology affects production (e.g., assembly line, robots, and video streaming).</p> <p>SS2.4.2 Identify tools and technologies that make life easier (e.g., cars for getting one place to another, washing machines for washing clothes, or flashlights to see in the dark).</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.</p>

Appendices/Resources that are available include:

- **Appendix A - A Model of the Three Dimensions of Science Learning**
- **Appendix B - Three Dimensions of Learning Framework**
- **Appendix C - ISTE Standards (International Society of Technology in Education)**
- **Appendix D - Connections to the Literacy Standards, ELA, and Mathematics Standards**
- **Appendix E - Disciplinary Core Ideas**
- **Appendix F - Science & Engineering Practices**
- **Appendix G - Crosscutting Concepts**
- **Appendix H - Nature of Science**
- **Appendix I - Engineering, Technology, and Applications of Science**
- **Appendix J - Glossary**
- **Appendix K - Acronyms**

These and other resources can be found at

<https://edu.wyoming.gov/educators/standards/science>