

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

2016 WYOMING SCIENCE CONTENT AND PERFORMANCE STANDARDS

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:

- 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.

- Identify the evidence that supports particular points in an explanation.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections

W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.

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.

W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

Social Studies Connections

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.

Mathematics Connections

MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

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.

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.

Second Grade



Second grade performance expectations include **PS1, LS2, LS4, ESS1, ESS2, and ETS1 Disciplinary Core Ideas** adapted from NRC Framework. The performance expectations in second grade help students formulate answers to questions such as: “How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water? How

are materials similar and different from one another, and how do the properties of the materials relate to their use? What do plants need to grow? How many types of living things live in a place?” Students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students are also expected to compare the diversity of life in different habitats. An understanding of observable properties of materials is developed by students at this level through analysis and classification of different materials. Students are able to apply their understanding of the idea that wind and water can change the shape of the land to compare design solutions to slow or prevent such change. Students are able to use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth.

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 second 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



Matter and Its Interactions [2-PS1-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.</p> <p>Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.</p>	Crosscutting Concepts	Patterns in the natural and human designed world can be observed.
	Disciplinary Core Ideas	<p>Structure and Properties of Matter:</p> <ul style="list-style-type: none"> Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. Different properties are suited to different purposes.
	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, which provide data to support explanations or design solutions.</p> <ul style="list-style-type: none"> Plan and conduct an investigation 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.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p>		<p>MP.4 Model with mathematics.</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>



Matter and Its Interactions [2-PS1-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.</p> <p><i>Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.</i></p> <p><i>State Assessment Boundary: Assessment of quantitative measurements is limited to length.</i></p> <p>Engineering, Technology & Application of Science Connections—K-2-ETS1-3 (pg. 49)</p>	<p>Crosscutting Concepts</p>	<p>Simple tests can be designed to gather evidence to support or refute student ideas about causes.</p>
	<p>Disciplinary Core Ideas</p>	<p>Structure and Properties of Matter:</p> <ul style="list-style-type: none"> Different properties are suited to different purposes. <p>Optimizing the design Solution:</p> <ul style="list-style-type: none"> Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.
	<p>Science & Engineering Practices</p>	<p>Analyzing and interpreting data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <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		Mathematics Connections
<p>RI.2.8 Describe how reasons support specific points the author makes in a text.</p> <p>W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 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>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>



Matter and Its Interactions [2-PS1-3]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.</p> <p><i>Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.</i></p> <p>Engineering, Technology & Application of Science Connections K-2-ETS1-1 (pg. 47)</p>	Crosscutting Concepts	Objects may break into smaller pieces and be put together into larger pieces, or change shapes.
	Disciplinary Core Ideas	<p>Structure and Properties of Matter:</p> <ul style="list-style-type: none"> Different properties are suited to different purposes. A great variety of objects can be built up from a small set of pieces. <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.
	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>W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p>		<p>N/A</p>



Matter and Its Interactions [2-PS1-4]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.</p> <p><i>Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.</i></p>	Crosscutting Concepts	Events have causes that generate observable patterns.
	Disciplinary Core Ideas	Chemical Reactions: <ul style="list-style-type: none"> • Heating or cooling a substance may cause changes that can be observed. • Sometimes these changes are reversible, and sometimes they are not.
	Science & Engineering Practices	Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s). <ul style="list-style-type: none"> • Construct an argument with evidence to support a claim.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Mathematics Connections
<p>RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.</p> <p>RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.</p> <p>RI.2.8 Describe how reasons support specific points the author makes in a text.</p> <p>W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.</p>	<p>SS2.6.1 Identify what kinds of information can be found in different resources (e.g., library, computer, atlas, and dictionary).</p>	<p>N/A</p>



Ecosystems: Interactions, Energy, and Dynamics [2-LS2-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.</p> <p>State Assessment Boundary: Assessment is limited to testing one variable at a time.</p>	Crosscutting Concepts	Events have causes that generate observable patterns.
	Disciplinary Core Ideas	Interdependent Relationships in Ecosystems: <ul style="list-style-type: none"> Plants depend on water and light to grow.
	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"> Plan and conduct an investigation 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.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 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>



Ecosystems: Interactions, Energy, and Dynamics [2-LS2-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.</p> <p>Clarification Statement: Examples could include the natural structure of an animal that helps it disperse seeds (e.g., hair that snares seeds, squirrel cheek pouches that transport seeds) or that helps it pollinate plants (e.g., bees have fuzzy bodies to which pollen sticks, hummingbirds' bodies transport pollen).</p> <p>Engineering, Technology & Application of Science Connections K-2 ETS1-2 (pg. 48)</p>	<p>Crosscutting Concepts</p>	<p>The shape and stability of structures of natural and designed objects are related to their function(s).</p>
	<p>Disciplinary Core Ideas</p>	<p>Interdependent Relationships in Ecosystems:</p> <ul style="list-style-type: none"> Plants depend on animals for pollination or to move their seeds around. <p>Developing Possible Solutions:</p> <ul style="list-style-type: none"> Designs can be conveyed through sketches, drawings, or physical models. These 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, 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	Fine & Performing Arts Connections	Mathematics 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>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.A.6 Students complete and exhibit their artwork.</p>	<p>MP.4 Model with mathematics.</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.</p>



Biological Unity and Diversity [2-LS4-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.</p> <p><i>Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.</i></p> <p><i>State Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.</i></p>	Crosscutting Concepts	<i>Intentionally Left Blank</i>
	Disciplinary Core Ideas	<p>Biodiversity and Humans:</p> <ul style="list-style-type: none"> There are many different kinds of living things in any area, and they exist in different places on land and in water.
	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, which provide data to support explanations or design solutions.</p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to collect data which can be used to make comparisons.
Wyoming Cross-Curricular Connections		
ELA / Literacy Connections		Mathematics Connections
<p>W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 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>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.</p>



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

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.</p> <p><i>Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.</i></p> <p><i>State Assessment Boundary: Assessment does not include quantitative measurements of timescales.</i></p> <p>ISTE-3. Students apply digital tools to gather, evaluate, and use information.</p>	Crosscutting Concepts	Things may change slowly or rapidly.
	Disciplinary Core Ideas	<p>The History of Planet Earth:</p> <ul style="list-style-type: none"> Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.
	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"> Make observations from several sources to construct an evidence-based account for natural phenomena.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Mathematics Connections
<p>RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.</p> <p>RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures 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.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question.</p> <p>SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.</p>	<p>SS2.6.1 Identify what kinds of information can be found in different resources (e.g., library, computer, atlas, and dictionary).</p>	<p>MP.4 Model with mathematics.</p> <p>2.NBT.A Understand place value</p>



Earth's Systems [2-ESS2-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.</p> <p><i>Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.</i></p> <p>Engineering, Technology & Application of Science Connections—K-2-ETS1-3 (pg. 49)</p> <p>ISTE-3. Students apply digital tools to gather, evaluate, and use information.</p>	Crosscutting Concepts	<p>Things may change slowly or rapidly.</p>
	Disciplinary Core Ideas	<p>Earth Materials and Systems:</p> <ul style="list-style-type: none"> • Wind and water can change the shape of the land. <p>Optimizing the Design Solution:</p> <ul style="list-style-type: none"> • Because there is always more than one possible solution to a problem, it is useful to compare and test designs.
	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"> • Compare multiple solutions to a problem.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Mathematics Connections
<p>RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.</p> <p>RI.2.9 Compare and contrast the most important points presented by two texts on the same topic.</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.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.</p>



Earth's Systems [2-ESS2-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.</p> <p>State Assessment Boundary: Assessment does not include quantitative scaling in models.</p>	Crosscutting Concepts	Patterns in the natural world can be observed.
	Disciplinary Core Ideas	Plate Tectonics and Large-Scale System Interactions: <ul style="list-style-type: none"> • Maps show where things are located. One can map the shapes and kinds of land and water in any area.
	Science & Engineering Practices	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, storyboard) that represent concrete events or design solutions. <ul style="list-style-type: none"> • Develop a model to represent patterns in the natural world.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Social Studies Connections	Fine & Performing Arts Connections	Mathematics 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>SS2.5.1 Use a map, globe, and mental mapping to identify familiar areas and simple patterns and create maps using various media.</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.A.6 Students complete and exhibit their artwork.</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.</p>



Earth's Systems [2-ESS2-3]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid, liquid, or gas.</p> <p>ISTE-3. Students apply digital tools to gather, evaluate, and use information.</p>	Crosscutting Concepts	Patterns in the natural world can be observed.
	Disciplinary Core Ideas	<p>The Roles of Water in Earth's Surface Processes:</p> <ul style="list-style-type: none"> • Water is found in the ocean, rivers, lakes, and ponds. • Water exists as solid ice, liquid form, or as a gas.
	Science & Engineering Practices	<p>Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.</p> <ul style="list-style-type: none"> • Obtain information using various texts, text features (e.g., headings, tables, contents, glossaries, electronic menus, icons, and other media that will be useful in answering scientific questions.

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 questions.</p>	<p>SS2.6.1 Identify what kinds of information can be found in different resources (e.g., library, computer, atlas, and dictionary).</p> <p>SS2.5.1 Use a map, globe, and mental mapping to identify familiar areas and simple patterns and create maps using various media.</p>	N/A



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 2-PS1-3 (pg. 38)</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 2-LS2-2 (pg. 41)</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	
<p>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.</p> <p>Science Standards Connections 2-PS1-2 (pg. 37) 2-ESS2-1 (pg. 44)</p>	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>