

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

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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:

- 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	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.

Kindergarten



Kindergarten performance expectations include **PS2, PS3, LS1, ESS2, ESS3, and ETS1 Disciplinary Core Ideas** adapted from the NRC Framework. The performance expectations in kindergarten help students formulate answers to questions such as: “What happens if you push or pull an object harder? Where do animals live and why do they live there? What is the weather like today and how is it different from yesterday?” Students are expected

to develop understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for, and respond to, severe weather. Students are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution. Students are also expected to develop understanding of what plants and animals (including humans) need to survive and the relationship between their needs and where they live.

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 kindergarten 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



Motion and Stability: Forces and Interactions [K-PS2-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.</p> <p>Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.</p> <p>State Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.</p>	Crosscutting Concepts	Simple tests can be designed to gather evidence to support or refute student ideas about causes.
	Disciplinary Core Ideas	<p>Forces and Motion:</p> <ul style="list-style-type: none"> Pushes and pulls can have different strengths and directions. Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. <p>Types of Interactions:</p> <ul style="list-style-type: none"> When objects touch or collide, they push on one another and can change motion. <p>Relationship Between Energy and Forces:</p> <ul style="list-style-type: none"> A bigger push or pull makes things speed up or slow down more quickly.
	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"> With guidance, plan and conduct an investigation in collaboration with peers.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections		Mathematics Connections
<p>W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).</p>		<p>MP.2 Reason abstractly and quantitatively.</p> <p>K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p>K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute, and describe the difference.</p>



Motion and Stability: Forces and Interactions [K-PS2-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.</p> <p><i>Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.</i></p> <p><i>State Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.</i></p> <p>Engineering, Technology & Application of Science Connections K-2-ETS1-1 (pg. 19)</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>Forces and Motion:</p> <ul style="list-style-type: none"> Pushes and pulls can have different strengths and directions. Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. <p>Defining 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. Such problems may have many acceptable solutions.
	<p>Science & Engineering Practices</p>	<p>Analyzing 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.K.1 With prompting and support, ask and answer questions about key details in a text.</p> <p>SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood.</p>	<p>K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p>K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.</p> <p>K.CC.C.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.</p> <p>K.CC.C.7 Compare two numbers between 1 and 10 presented as written numerals.</p>

Energy [K-PS3-1]



Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-PS3-1. Make observations to determine the effect of sunlight on Earth’s surface.</p> <p><i>Clarification Statement: Examples of Earth’s surface could include sand, soil, rocks, and water.</i></p> <p><i>State Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.</i></p>	Crosscutting Concepts	Events have causes that generate observable patterns.
	Disciplinary Core Ideas	Conservation of Energy and Energy Transfer: <ul style="list-style-type: none"> • Sunlight warms Earth’s surface.
	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"> • 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
W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).		K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference.

Energy [K-PS3-2]



Performance Expectations (Benchmark)

K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.

Engineering, Technology & Application of Science Connections

K-2-ETS1-1 (pg. 19)

K-2-ETS1-2 (pg. 20)

Three Dimensions of Learning

Crosscutting Concepts

Events have causes that generate observable patterns.

Disciplinary Core Ideas

Conservation of Energy and Energy Transfer:

- Sunlight warms Earth’s surface.

Defining and Delimiting Engineering Problems:

- 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.

Developing Possible Solutions:

- 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

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.

- 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

W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).

Fine & Performing Arts Connections

FPA4.1.A.1 Students create and revise original art to express ideas, experiences, and stories.
FPA4.1.A.3 Students apply the elements and principles of design to their artwork.
FPA4.1.A.5 Students use art materials and tools in a safe and responsible manner.
FPA4.1.A.6 Students complete and exhibit their artwork.

Mathematics Connections

K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference.



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

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.</p> <p><i>Clarification Statement: Examples of patterns could include that animals need to take in food but plants make their own food; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.</i></p> <p>Engineering, Technology, & Applications of Science Connections K-2-ETS1-1 (pg. 19) K-2-ETS1-2 (pg. 20)</p> <p>ISTE-3 Students apply digital tools to gather, evaluate, and use information.</p>	Crosscutting Concepts	Matter is transported into, out of, and within systems.
	Disciplinary Core Ideas	<p>Organization of Matter and Energy Flow in Organisms:</p> <ul style="list-style-type: none"> Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.
	Science & Engineering Practices	<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"> 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	Health Connections	Fine & Performing Arts Connections	Mathematics Connections
<p>W.K. 7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).</p>	<p>HE2.3.4 Identify characteristics of effective listening skills to enhance or reduce/avoid health risks (e.g., eyes on speaker, etc.). PCD, IP/S, FA.</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. FPA4.1.A.5 Students use art materials and tools in a safe and responsible manner.</p>	<p>K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute, and describe the difference.</p>



Earth's Systems [K-ESS2-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.</p> <p>Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.</p> <p>State Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.</p>	<p>Crosscutting Concepts</p>	<p>Patterns in the natural and human designed world can be observed and used as evidence.</p>
	<p>Disciplinary Core Ideas</p>	<p>Weather and Climate:</p> <ul style="list-style-type: none"> • Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. • People measure these conditions to describe and record the weather and to notice patterns over time.
	<p>Science & Engineering Practices</p>	<p>Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <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.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).</p>		<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>K.CC.A Know number names and the count sequence.</p> <p>K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p>K.MD.B.3 Classify objects into given categories; count the number of objects in each category and sort the categories by count.</p>



Earth's Systems [K-ESS2-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.</p> <p><i>Clarification Statement: Examples of plants and animals changing their environment could include: a squirrel digs in the ground to hide its food and tree roots can break concrete.</i></p>	<p>Crosscutting Concepts</p>	<p>Systems in the natural and designed world have parts that work together.</p>
	<p>Disciplinary Core Ideas</p>	<p>Biogeology:</p> <ul style="list-style-type: none"> Plants and animals can change their environment. <p>Human Impacts on Earth Systems:</p> <ul style="list-style-type: none"> Things that people do to live comfortably can affect the world around them.
	<p>Science & Engineering Practices</p>	<p>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).</p> <ul style="list-style-type: none"> Construct an argument with evidence to support a claim.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections		Mathematics Connections
<p>RI.K.1 With prompting and support, ask and answer questions about key details in a text.</p> <p>W.K.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book.</p> <p>W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.</p>		<p>K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p>



Earth and Human Activity [K-ESS3-1]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.</p> <p>Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested and rangeland areas; and, grasses need sunlight so they often grow in meadows and prairies. Plants, animals, and their surroundings make up a system.</p> 	<p>Crosscutting Concepts</p>	<p>Systems in the natural and designed world have parts that work together.</p>
	<p>Disciplinary Core Ideas</p>	<p>Natural Resources:</p> <ul style="list-style-type: none"> • Living things need water, air, and resources from the land, and they live in places that have the things they need. • Humans use natural resources for everything they do.
	<p>Science & Engineering Practices</p>	<p>Modeling 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"> • Use a model to represent relationships in the natural world.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Fine & Performing Arts Connections	Mathematics Connections
<p>SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail.</p>	<p>FPA 4.1.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>FPA 4.1.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>K.CC Counting and Cardinality</p>



Earth and Human Activity [K-ESS3-2]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-ESS3-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.</p> <p>Clarification Statement: Emphasis is on local forms of severe weather.</p> <p>Engineering, Technology & Application of Science Connections K-2-ETS1-1 (pg. 19)</p>	Crosscutting Concepts	Events have causes that generate observable patterns.
	Disciplinary Core Ideas	<p>Natural Hazards:</p> <ul style="list-style-type: none"> Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. <p>Defining and Delimiting an Engineering Problem:</p> <ul style="list-style-type: none"> Asking questions, making observations, and gathering information are helpful in thinking about problems.
	Science & Engineering Practices	<p>Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.</p> <ul style="list-style-type: none"> Ask questions based on observations to find more information about the designed world. <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"> Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world.
Wyoming Cross-Curricular Connections		
ELA / Literacy Connections	Health Connections	Mathematics Connections
<p>RI.K.1 With prompting and support, ask and answer questions about key details in a text.</p> <p>SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood.</p>	<p>HE2.1.4 Identify ways to contact or find help for health and safety emergencies (e.g., call 911, find playground monitor). VP/B, IP/S, FA.</p> <p>HE2.3.3 Identify appropriate ways to respond to/in unwanted, threatening or dangerous situations. IP/S., PH, VP/B.</p>	<p>MP.4 Model with mathematics.</p> <p>K.CC Counting and Cardinality</p>



Earth and Human Activity [K-ESS3-3]

Performance Expectations (Benchmark)	Three Dimensions of Learning	
<p>K-ESS3-3. Communicate solutions that will manage the impact of humans on the land, water, air, and/or other living things in the local environment.</p> <p><i>Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.</i></p> <p>Engineering, Technology & Application of Science Connections K-2-ETS1-2 (pg. 20)</p>	<p>Crosscutting Concepts</p>	<p>Events have causes that generate observable patterns.</p>
	<p>Disciplinary Core Ideas</p>	<p>Human Impacts on Earth Systems:</p> <ul style="list-style-type: none"> Things that people do to live comfortably can affect the world around them. But they can make choices that manage their impacts on the land, water, air, and other living things. <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>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"> Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas.

Wyoming Cross-Curricular Connections

ELA / Literacy Connections	Health Connections	Mathematics Connections
<p>W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.</p>	<p>HE2.3.4 Identify characteristics of effective listening skills to enhance or reduce/avoid health risks (e.g., eyes on speaker, etc.). PCD, IP/S, FA.</p> <p>HE2.4.2 Identify behaviors that help avoid or reduce health risks. IP/S, VP/B, ATOD.</p> <p>HE2.4.3 Identify behaviors that prevent the spread of disease. CEH, PH, PCD.</p>	<p>N/A</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 K-PS2-2 (pg. 10) K-PS3-2 (pg. 12) K-LS1-1 (pg. 13) K-ESS3-2 (pg. 17)</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, what, where, when, why, and 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 K-PS3-2 (pg. 12) K-LS1-1 pg. 13) K-ESS3-3 (pg. 18)</p>	Crosscutting Concepts	The shape and stability of structures of natural and designed objects are related to their function(s).
	Disciplinary Core Ideas	Developing Possible Solutions: <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.
	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, or storyboard) that represent concrete events or design solutions. <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>