A Correlation of

Pearson
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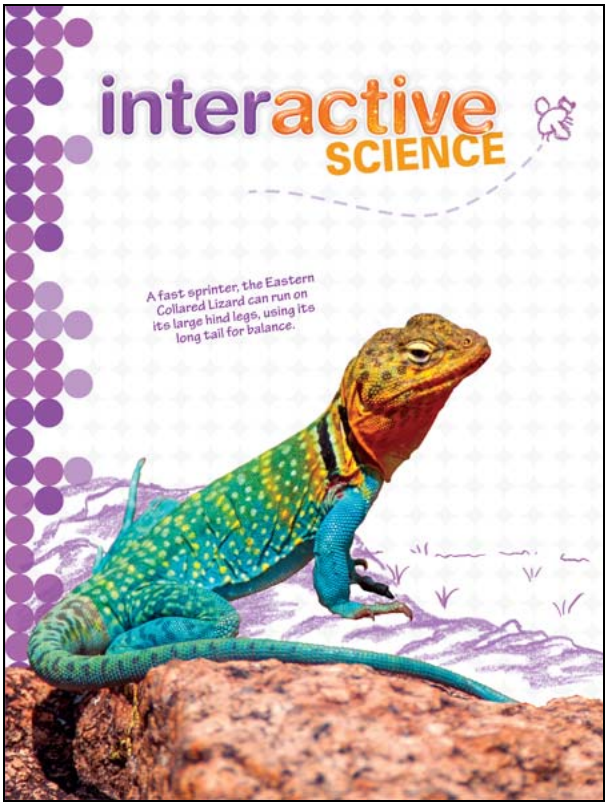

To the

Iowa Core Science Standards
Foundation Boxes and Evidence Statements
Grade 5

Pearson

Introduction

The following document demonstrates how the ***Interactive Science*, *©2016*** program aligns to the Iowa Core Science Standards for grades K-5. Correlation references are to the Student Edition and Teacher Edition. Please note that the Kindergarten Student Edition text pages are two-sided; each singular page contains a corresponding Activity Page on the reverse side.

Interactive Science is an elementary science program that makes learning personal, engaging, and relevant for today's student. The program features an innovative Write-in Student Edition that enables students to become active participants in their learning and truly connect the Big Ideas of science to their world.

The 2016 editions of ***Interactive Science*** were developed to support the Iowa Science Standards (NGSS) for Grades K-5 in several ways. In the Student Edition, lessons provide interactive opportunities for students to acquire the Disciplinary Core Ideas that are the building blocks of the NGSS Performance Expectations at each grade level. STEM Activities, Apply It! activities, Design It! Activities, and Performance-Based Assessments enable students to research, investigate, and apply Science and Engineering Practices to real-world problems in a meaningful way. In the Teacher's Edition, the NGSS Cross-Cutting Concepts that link across grade levels and across disciplines within grade levels are noted at the chapter level, and a detailed and focused Performance Expectation Activity is provided for each NGSS standard.

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Grade 5

5-PS1-1 Matter and Its Interactions

Students who demonstrate understanding can:

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [*Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.*]
Chapter 1 Performance Expectation Activity, 99a

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Use models to describe phenomena. (5-PS1-1) **SE/TE:** 4-7, STEM Activity; 13, Lightning Lab; 16, Explore It!; 34, Explore It!; 36, At-Home Lab	**PS1.A: Structure and Properties of Matter** • Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) **SE/TE:** 8, My Planet Diary; 9, Matter; 12, Atoms; 13, Atomic Arrangement; 14-15, Compounds; 48, Chapter Review – Lesson 1 **TE Only:** 1C-1D, Teacher Background; 1G-1H, Leveled Content Reader Support; 8, Common Misconception; 15, Professional Development Note; 15a, My Planet Diary; 15b, Lesson 1 Check – Questions 1, 3, 4; 49a, Chapter 1 Test – Question 5; 99a, Performance Expectation Activity	**Scale, Proportion, and Quantity** • Natural objects exist from the very small to the immensely large. (5-PS1-1) **SE/TE:** 1, What makes up these giant crystals?; 9, Matter; 12, Atoms; 13, Atomic Arrangement; 48, Chapter Review – Lesson 1 **TE Only:** 1G-1H, Leveled Content Reader Support; 1I, Read Aloud; 1I, Professional Development Note; 15b, Lesson 1 Check – Questions 1, 3, 4; 49a, Chapter 1 Test – Question 5; 99a, Performance Expectation Activity

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a model to describe* a phenomenon that includes the idea that matter is made of particles too small to be seen. In the model, students identify the relevant components for the phenomenon, including:
		i. Bulk matter (macroscopic observable matter; e.g., as sugar, air, water).
		ii. Particles of matter that are too small to be seen.
2	Relationships	
	a	In the model, students identify and describe* relevant relationships between components, including the relationships between:
		i. Bulk matter and tiny particles that cannot be seen (e.g., tiny particles of matter that cannot be seen make up bulk matter).
		ii. The behavior of a collection of many tiny particles of matter and observable phenomena involving bulk matter (e.g., an expanding balloon, evaporating liquids, substances that dissolve in a solvent, effects of wind).
3	Connections	
	a	Students use the model to describe* how matter composed of tiny particles too small to be seen can account for observable phenomena (e.g., air inflating a basketball, ice melting into water).

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5-PS1-2 Matter and Its Interactions

Students who demonstrate understanding can:

5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [*Assessment Boundary: Assessment does not include distinguishing mass and weight.*]
Chapter 1 Performance Expectation Activity, 99b

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematics and Computational Thinking Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. • Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2) **SE/TE:** 2, Try It! **TE Only:** 1, SEP: Using Mathematics and Computational Thinking; 99b, Performance Expectation Activity	**PS1.A: Structure and Properties of Matter** • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) **SE/TE:** 2, Try It!; 9, Matter **TE Only:** 1C, Teacher Background; 99b, Performance Expectation Activity; 99b, ELA/Literacy; 99b, Mathematics **PS1.B: Chemical Reactions** • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2) **SE/TE:** 2, Try It!; 9, Matter **TE Only:** 1C, Teacher Background; 99b, Performance Expectation Activity; 99b, ELA/Literacy; 99b, Mathematics	**Scale, Proportion, and Quantity** • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3) **SE/TE:** 2, Try It!; 19, Volume; 20, Temperature; 24, Solids, Liquids, Gases, Plasmas; 26, Do the Math!; 48, Chapter Review – Lesson 3; 336, Explore It!; 342, Lightning Lab; EM1, Measurements **TE Only:** 1I, CCC: Scale, Proportion, and Quantity; 21b, Lesson 2 Check – Questions 1, 3, 4, 6); 99a, Performance Expectation Activity; 99a, Mathematics; 99b, Performance Expectation Activity; 99b, Mathematics; EM1, Measurements

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		---------- ***Connections to Nature of Science*** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** • Science assumes consistent patterns in natural systems. (5-PS1-2) **SE/TE:** 2, Try It!; 20, Temperature; 22, Explore It!; 25, Freezing and Melting; 25, Lightning Lab; 26, Evaporation; 27, Condensation **TE Only:** 27a, Explore It!

Observable features of the student performance by the end of the grade:		
1	Representation	
	a	Students measure and graph the given quantities using standard units, including:
		i. The weight of substances before they are heated, cooled, or mixed.
		ii. The weight of substances, including any new substances produced by a reaction, after they are heated, cooled, or mixed.
2	Mathematical/computational analysis	
	a	Students measure and/or calculate the difference between the total weight of the substances (using standard units) before and after they are heated, cooled, and/or mixed.
	b	Students describe* the changes in properties they observe during and/or after heating, cooling, or mixing substances.
	c	Students use their measurements and calculations to describe* that the total weights of the substances did not change, regardless of the reaction or changes in properties that were observed.
	d	Students use measurements and descriptions* of weight, as well as the assumption of consistent patterns in natural systems, to describe* evidence to address scientific questions about the conservation of the amount of matter, including the idea that the total weight of matter is conserved after heating, cooling, or mixing substances.

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5-PS1-3 Matter and Its Interactions

Students who demonstrate understanding can:

5-PS1-3. Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [*Assessment Boundary: Assessment does not include density or distinguishing mass and weight.*]

Chapter 1 Performance Expectation Activity, 99c

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3) **SE/TE:** 16, Explore It!; 22, Explore It!; 25, Lightning Lab; 28, Explore It!; 34, Explore It!; 98, Plan an Investigation 336, Explore It!; 344, Explore It! **TE Only:** 21a, Explore It!; 27a, Explore It!; 33a, Explore It!; 39a, Explore It!; 99b, Performance Expectation Activity; 99c, Performance Expectation Activity; 343a, Explore It!; 347a, Explore It!	**PS1.A: Structure and Properties of Matter** • Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3) **SE/TE:** 2, Try It!; 3, Let's Read Science!; 10-11, Elements; 16-21, Lesson 2; 25, Freezing and Melting; 28, Explore It!; 33 Solubility **TE Only:** 21b, Lesson 2 Check – Questions 1-4, 7; 33a, Explore It!; 99b, Performance Expectation Activity; 99b, Mathematics; 99c, Performance Expectation Activity	**Scale, Proportion, and Quantity** • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3) **SE/TE:** 2, Try It!; 19, Volume; 20, Temperature; 24, Solids, Liquids, Gases, Plasmas; 26, Do the Math!; 48, Chapter Review – Lesson 3; 336, Explore It!; 342, Lightning Lab; EM1, Measurements **TE Only:** 1I, CCC: Scale, Proportion, and Quantity; 21b, Lesson 2 Check – Questions 1, 3, 4, 6); 99a, Performance Expectation Activity; 99a, Mathematics; 99b, Performance Expectation Activity; 99b, Mathematics; EM1, Measurements

Observable features of the student performance by the end of the grade:		
1	Identifying the phenomenon under investigation	
	a	From the given investigation plan, students identify the phenomenon under investigation, which includes the observable and measurable properties of materials.
	b	Students identify the purpose of the investigation, which includes collecting data to serve as the basis for evidence for an explanation about the idea that materials can be identified based on their observable and measurable properties.
2	Identifying the evidence to address the purpose of the investigation	
	a	From the given investigation plan, students describe* the evidence from data (e.g., qualitative observations and measurements) that will be collected, including:
		i. Properties of materials that can be used to identify those materials (e.g., color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility).
	b	Students describe* how the observations and measurements will provide the data necessary to address the purpose of the investigation.
3	Planning the investigation	
	a	From the given plan investigation plan, students describe* how the data will be collected. Examples could include:
		i. Quantitative measures of properties, in standard units (e.g., grams, liters).
		ii. Observations of properties such as color, conductivity, and reflectivity.
		iii. Determination of conductors vs. nonconductors and magnetic vs. nonmagnetic materials.
	b	Students describe* how the observations and measurements they make will allow them to identify materials based on their properties.
4	Collecting the data	
	a	Students collect and record data, according to the given investigation plan.

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5-PS1-4 Matter and Its Interactions

Students who demonstrate understanding can:

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
Chapter 1 Performance Expectation Activity, 99d

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4) **SE/TE:** 16, Explore It!; 38, Lightning Lab; 40-41, Investigate It!; 98, Plan an Investigation; 99, Investigate Mixtures; 348-349, Investigate It! **TE Only:** 21a, Explore It!; 30, Professional Development Note; 41a-41d, Activity Card Support; 99d, Performance Expectation Activity	**PS1.B: Chemical Reactions** • When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4) **SE/TE:** 14-15, Compounds; 37, Chemical Changes; 38-39, Temperature and Chemical Changes; 42, Sidewalks and Playgrounds; 49, Chapter Review – Lessons 4 and 5; 50, Benchmark Practice – Questions 8, 9; 99, Investigate Mixtures **TE Only:** 1G-1H, Leveled Content Reader Support; 39b, Lesson 5 Check – Questions 2, 5, 6; 49b, Chapter 1 Test – Question 8; 99d, Performance Expectation Activity; 99d, ELA/Literacy	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (5-PS1-4) **SE/TE:** 16, Explore It!; 22, Explore It!; 34, Explore It! **TE Only:** 21a, Explore It!; 27a, Explore It!; 27b, Lesson 3 Check – Question 6; 32, 21st Century Learning; 52

Observable features of the student performance by the end of the grade:		
1	Identifying the phenomenon under investigation	
	a	From the given investigation plan, students describe* the phenomenon under investigation, which includes the mixing of two or more substances.
	b	Students identify the purpose of the investigation, which includes providing evidence for whether new substances are formed by mixing two or more substances, based on the properties of the resulting substance.
2	Identifying the evidence to address the purpose of the investigation	
	a	From the given investigation plan, students describe* the evidence from data that will be collected, including:
		i. Quantitative (e.g., weight) and qualitative properties (e.g., state of matter, color, texture, odor) of the substances to be mixed.
		ii. Quantitative and qualitative properties of the resulting substances.
	b	Students describe* how the collected data can serve as evidence for whether the mixing of the two or more tested substances results in one or more new substances.
3	Planning the investigation	
	a	From the given investigation plan, students describe* how the data will be collected, including:
		vii. How quantitative and qualitative properties of the two or more substances to be mixed will be determined and measured.
		viii. How quantitative and qualitative properties of the substances that resulted from the mixture of the two or more substances will be determined and measured.
		ix. Number of trials for the investigation.
		x. How variables will be controlled to ensure a fair test (e.g., the temperature at which the substances are mixed, the number of substances mixed together in each trial).
4	Collecting the data	
	a	According to the investigation plan, students collaboratively collect and record data, including data about the substances before and after mixing.

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5-PS2-1 Motion and Stability: Forces and Interaction

Students who demonstrate understanding can:

5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down. [Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.] [*Assessment Boundary: Assessment does not include mathematical representation of gravitational force.*]

Chapter 2 Performance Expectation Activity, 99e

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model. (5-PS2-1),(5-ESS1-1) **TE Only:** 53, Engaging in Argument from Evidence; 99e, Performance Expectation Activity; 99e, ELA/Literacy; 257, SEP: Engaging in Argument from Evidence; 313c, Performance Expectation Activity; 313c, ELA/Literacy	**PS2.B: Types of Interactions** • The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1) **SE/TE:** 60, My Planet Diary, 64, Gravity; 64, At-Home Lab; 74, Explore It!; 76-77, Balanced Forces; 218, Barometric Pressure; 238-239, Water Erosion and Deposition **TE Only:** 65, RTI: Response to Intervention; 77a, Explore It!; 99e, Performance Expectation Activity; 99e, ELA/Literacy	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1) **SE/TE:** 272, Lightning Lab; 296-297, Investigate It!; 312, Crater Formation **TE Only:** xlvi-xlvii, QUEST; 52, CCC: Cause and Effect; 297a-297c, Activity Card Support; 313d, Performance Expectation Activity

Observable features of the student performance by the end of the grade:		
1	Supported claims	
	a	Students identify a given claim to be supported about a phenomenon. The claim includes the idea that the gravitational force exerted by Earth on objects is directed down toward the center of Earth.
2	Identifying scientific evidence	
	a	Students identify and describe* the given evidence, data, and/or models that support the claim, including:
		i. Multiple lines of evidence that indicate that the Earth's shape is spherical (e.g., observation of ships sailing beyond the horizon, the shape of the Earth's shadow on the moon during an eclipse, the changing height of the North Star above the horizon as people travel north and south).
		ii. That objects dropped appear to fall straight down.
		iii. That people live all around the spherical Earth, and they all observe that objects appear to fall straight down.
3	Evaluation and critique	
	a	Students evaluate the evidence to determine whether it is sufficient and relevant to supporting the claim.
	b	Students describe* whether any additional evidence is needed to support the claim.
4	Reasoning and synthesis	
	a	Students use reasoning to connect the relevant and appropriate evidence to support the claim with argumentation. Students describe* a chain of reasoning that includes:
		i. If Earth is spherical, and all observers see objects near them falling directly "down" to the Earth's surface, then all observers would agree that objects fall toward the Earth's center.
		ii. Since an object that is initially stationary when held moves downward when it is released, there must be a force (gravity) acting on the object that pulls the object toward the center of Earth.

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5-PS3-1 Energy

Students who demonstrate understanding can:

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.]

Chapter 4 Performance Expectation Activity, 195a

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Use models to describe phenomena. (5-PS3-1) **SE/TE:** 162, Lightning Lab; 195, Create a Food Web Model **TE Only:** 143, SEP: Developing and Using Models; 163, Science Notebook; 195a, Performance Expectation Activity; 195c, Performance Expectation Activity	**PS3.D: Energy in Chemical Processes and Everyday Life** • The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1) **SE/TE:** 37, Chemical Changes; 112-113, Structures for Respiration and Circulation; 150-157, Lesson1; 186, Chapter Review, Lesson 1 **TE Only:** 157b, Lesson 1 Check – Questions 3, 6; 187a, Chapter 1 Test – Questions 1, 3; 195a, Performance Expectation Activity; 195c, Performance Expectation Activity; 195c, ELA/Literacy **LS1.C: Organization for Matter and Energy Flow in Organisms** • 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. **SE/TE:** 151, Plants and Energy; 156-157, Respiration **TE Only:** 195a, Performance Expectation Activity	**Energy and Matter** • Energy can be transferred in various ways and between objects. (5-PS3-1) **SE/TE:** 151, Plants and Energy; 162, Food Chains; 163, Food Webs **TE Only:** 100, CCC: Energy and Matter; 154, Differentiated Instruction; 195a, Performance Expectation Activity; 195c, Performance Expectation Activity

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students use models to describe* a phenomenon that includes the idea that energy in animals' food was once energy from the sun. Students identify and describe* the components of the model that are relevant for describing* the phenomenon, including:
		i. Energy.
		ii. The sun.
		iii. Animals, including their bodily functions (e.g., body repair, growth, motion, body warmth maintenance).
		iv. Plants.
2	Relationships	
	a	Students identify and describe* the relevant relationships between components, including:
		i. The relationship between plants and the energy they get from sunlight to produce food.
		ii. The relationship between food and the energy and materials that animals require for bodily functions (e.g., body repair, growth, motion, body warmth maintenance).
		iii. The relationship between animals and the food they eat, which is either other animals or plants (or both), to obtain energy for bodily functions and materials for growth and repair.
3	Connections	
	a	Students use the models to describe* causal accounts of the relationships between energy from the sun and animals' needs for energy, including that:
		i. Since all food can eventually be traced back to plants, all of the energy that animals use for body repair, growth, motion, and body warmth maintenance is energy that once came from the sun.
		ii. Energy from the sun is transferred to animals through a chain of events that begins with plants producing food then being eaten by animals.

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5-LS1-1 From Molecules to Organisms: Structures and Processes

Students who demonstrate understanding can:

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]
Chapters 3 and 4 Performance Expectation Activity, 195b

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model. (5-LS1-1) **SE/TE:** 132-133, Investigate It!; 133a-133d, Activity Card Support **TE Only:** 100D, In Thin Air; 101, SEP: Engaging in Argument from Evidence; 195b, Performance Expectation Activity; 195b, ELA/Literacy	**LS1.C: Organization for Matter and Energy Flow in Organisms** • Plants acquire their material for growth chiefly from air and water. (5-LS1-1) **SE/TE:** 112-113, Structures for Respiration and Circulation; 114, Explore It!; 132-133, Investigate It!; 146-149, STEM Activity; 150-157, Lesson 1 **TE Only:** 119a, Explore It!; 155, Science Notebook; 133a-133d, Activity Card Support; 157, Differentiated Instruction; 195b, Performance Expectation Activity; 195b, ELA/Literacy •	**Energy and Matter** • Matter is transported into, out of, and within systems. (5-LS1-1) **SE/TE:** 111, At-Home Lab; 144, Try It!; 158-165, Lesson 2; 187, Chapter Review - Question 11, 189. Go Green! **TE Only:** 100, CCC: Energy and Matter; 195a, Performance Expectation Activity; 195c Performance Expectation Activity

Observable features of the student performance by the end of the grade:		
1	Supported claims	
	a	Students identify a given claim to be supported about a given phenomenon. The claim includes the idea that plants acquire the materials they need for growth chiefly from air and water.
2	Identifying scientific evidence	
	a	Students describe* the given evidence, data, and/or models that support the claim, including evidence of:
		iv. Plant growth over time.
		v. Changes in the weight of soil and water within a closed system with a plant, indicating:
		1. Soil does not provide most of the material for plant growth (e.g., changes in weight of soil and a plant in a pot over time, hydroponic growth of plants).
		2. Plants' inability to grow without water.
		vi. Plants' inability to grow without air.
		vii. Air is matter (e.g., empty object vs. air filled object).
3	Evaluating and critiquing evidence	
	a	Students determine whether the evidence supports the claim, including:
		vii. Whether a particular material (e.g., air, soil) is required for growth of plants.
		viii. Whether a particular material (e.g., air, soil) may provide sufficient matter to account for an observed increase in weight of a plant during growth.
4	Reasoning and synthesis	
	a	Students use reasoning to connect the evidence to support the claim with argumentation. Students describe* a chain of reasoning that includes:
		i. During plant growth in soil, the weight of the soil changes very little over time, whereas the weight of the plant changes a lot. Additionally, some plants can be grown without soil at all.
		ii. Because some plants don't need soil to grow, and others show increases in plant matter (as measured by weight) but not accompanying decreases in soil matter, the material from soil must not enter the plant in sufficient quantities to be the chief contributor to plant growth.
		iii. Therefore, plants do not acquire most of the material for growth from soil.
		iv. A plant cannot grow without water or air. Because both air and water are matter and are transported into the plant system, they can provide the materials plants need for growth.
		v. Since soil cannot account for the change in weight as a plant grows and since plants take in water and air, both of which could contribute to the increase in weight during plant growth, plant growth must come chiefly from water and air.

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5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]
Chapter 4 Performance Expectation Activity, 195c

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop a model to describe phenomena. (5-LS2-1) **SE/TE:** 162, Lightning Lab; 195, Create a Food Web Model **TE Only:** 143, SEP: Developing and Using Models; 163, Science Notebook; 195a, Performance Expectation Activity; 195c, Performance Expectation Activity	**LS2.A: Interdependent Relationships in Ecosystems** • The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)	**Systems and System Models** • A system can be described in terms of its components and their interactions. (5-LS2-1) **SE/TE:** 111, At-Home Lab; 144, Try It!; 158-165, Lesson 2; 187, Chapter Review – Question 11 **TE Only:** 142, CCC: Systems and System Models; 195a, Performance Expectation Activity

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---------- ***Connections to the Nature of Science*** **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena** • Science explanations describe the mechanisms for natural events. (5-LS2-1) **SE/TE:** 144, Try It!; 151, Plants and Energy; 158, Explore It!; 162, Food Chains; 163, Food Webs; 348-349, Investigate It! **TE Only:** 152, Elaborate; 153, 21st Century Learning; 157, Differentiated Instruction; 165a, Explore It!; 349a-349d Activity Card Support	**SE/TE:** 151, Plants and Energy; 158-165, Lesson 2; 167, Environmental Changes; 176, Nonnative Species; 186, Chapter Review – Lesson 2; 188, Benchmark Practice – Questions 3, 4, 5; 195, Create a Food Web Model **TE Only:** 142, Predict; 165a, Explore It!; 165b, Lesson 2 Check – Questions 1-7; 187a, Chapter 4 Test – Questions 4, 5; 187b, Chapter 4 Test – Questions 8, 9, 10; 195a, Performance Expectation Activity; 195a, ELA/Literacy; 195c, Performance Expectation Activity; 195c, ELA/Literacy **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems** • Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1) **SE/TE:** 151, Plants and Energy; 154-155, Photosynthesis; 159, Interactions in Ecosystems; 162, Food Chains; 163, Food Webs; 186, Chapter Review – Lessons 1, 2; 189, Go Green! **TE Only:** 157b, Lesson 1 Check – Questions 1, 4, 6; 165b, Lesson 2 Check – Questions 1-5; 187b, Chapter 4 Test – Question 9; 195a, Performance Expectation Activity; 195c, Performance Expectation Activity	

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a model to describe* a phenomenon that includes the movement of matter within an ecosystem. In the model, students identify the relevant components, including:
		i. Matter.
		ii. Plants.
		iii. Animals.
		iv. Decomposers, such as fungi and bacteria.
		v. Environment.
2	Relationships	
	a	Students describe* the relationships among components that are relevant for describing* the phenomenon, including:
		i. The relationships in the system between organisms that consume other organisms, including:
		1. Animals that consume other animals.
		2. Animals that consume plants.
		3. Organisms that consume dead plants and animals.
		4. The movement of matter between organisms during consumption.
		ii. The relationship between organisms and the exchange of matter from and back into the environment (e.g., organisms obtain matter from their environments for life processes and release waste back into the environment, decomposers break down plant and animal remains to recycle some materials back into the soil).
3	Connections	
	a	Students use the model to describe*:
		i. The cycling of matter in the system between plants, animals, decomposers, and the environment.
		ii. How interactions in the system of plants, animals, decomposers, and the environment allow multiple species to meet their needs.
		iii. That newly introduced species can affect the balance of interactions in a system (e.g., a new animal that has no predators consumes much of another organism's food within the ecosystem).
		iv. That changing an aspect (e.g., organisms or environment) of the ecosystem will affect other aspects of the ecosystem.

A Correlation of Interactive Science, ©2016, to the Iowa Core Science Standards

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

5-ESS1-1 Earth's Place in the Universe

Students who demonstrate understanding can:

5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. [*Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).*]

Chapter 6 Performance Expectation Activity, 313c

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model. (5-PS2-1),(5-ESS1-1) **TE Only:** 53, Engaging in Argument from Evidence; 99e, Performance Expectation Activity; 99e, ELA/Literacy; 257, SEP: Engaging in Argument from Evidence; 313c, Performance Expectation Activity; 313c, ELA/Literacy	**ESS1.A: The Universe and its Stars** • The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1) **SE/TE:** 271,-275, Lesson 2 **TE Only:** 275b, Lesson 2 Check – Question 4; 313c, Performance Expectation Activity; 313c, ELA/Literacy; 313c, Mathematics	**Scale, Proportion, and Quantity** • Natural objects exist from the very small to the immensely large. (5-ESS1-1) **SE/TE:** 271, Stars; 272, Lightning Lab; 279, Mercury; 284, Explore It!; 285, Gas Giants; 289, Exploring the Giants; 292, Meteors; 293, Comets; 294, Dwarf Planets **TE Only:** 256G-256H, Leveled Content Reader Support; 289a, Explore It!

SE = Student Edition TE = Teacher's Edition

Observable features of the student performance by the end of the grade:		
1	Supported claims	
	a	Students identify a given claim to be supported about a given phenomenon. The claim includes the idea that the apparent brightness of the sun and stars is due to their relative distances from Earth.
2	Identifying scientific evidence	
	a	Students describe* the evidence, data, and/or models that support the claim, including:
		i. The sun and other stars are natural bodies in the sky that give off their own light.
		ii. The apparent brightness of a variety of stars, including the sun.
		iii. A luminous object close to a person appears much brighter and larger than a similar object that is very far away from a person (e.g., nearby streetlights appear bigger and brighter than distant streetlights).
		iv. The relative distance of the sun and stars from Earth (e.g., although the sun and other stars are all far from the Earth, the stars are very much farther away; the sun is much closer to Earth than other stars).
3	Evaluating and critiquing evidence	
	a	Students evaluate the evidence to determine whether it is relevant to supporting the claim, and sufficient to describe* the relationship between apparent size and apparent brightness of the sun and other stars and their relative distances from Earth.
	b	Students determine whether additional evidence is needed to support the claim.
4	Reasoning and synthesis	
	a	Students use reasoning to connect the relevant and appropriate evidence to the claim with argumentation. Students describe* a chain of reasoning that includes:
		i. Because stars are defined as natural bodies that give off their own light, the sun is a star.
		ii. The sun is many times larger than Earth but appears small because it is very far away.
		iii. Even though the sun is very far from Earth, it is much closer than other stars.
		iv. Because the sun is closer to Earth than any other star, it appears much larger and brighter than any other star in the sky.
		v. Because objects appear smaller and dimmer the farther they are from the viewer, other stars, although immensely large compared to the Earth, seem much smaller and dimmer because they are so far away.
		vi. Although stars are immensely large compared to Earth, they appear small and dim because they are so far away.
		vii. Similar stars vary in apparent brightness, indicating that they vary in distance from Earth.

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

5-ESS1-2 Earth's Place in the Universe

Students who demonstrate understanding can:

5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [*Assessment Boundary: Assessment does not include causes of seasons.*]

Chapter 6 Performance Expectation Activity, 313d

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2) **TE Only:** xlvi-xlvii, QUEST; 313a, Mathematics; 313b, Performance Expectation Activity; 313b, ELA/Literacy; 313d, Performance Expectation Activity	**ESS1.B: Earth and the Solar System** • The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) **SE/TE:** 264-269, Lesson 1; 272, Lightning Lab; 274,Constellations; 275, Stars on the Move; 278, Orbiting Objects; 281, Earth and Moon; 304, Chapter Review – Lesson 1; 306, Benchmark Practice – Question 5 **TE Only:** xlvi-xlvii, QUEST; 269a, Explore It!; 269b, Lesson 1 Check – Questions 1-6; 281, Science Notebook; 305a, Chapter 6 Test – Question 1; 305b, Chapter 6 Test – Question 9; 313d, Performance Expectation Activity; 313d, ELA/Literacy; 313d, Mathematics	**Patterns** • Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2) **SE/TE:** 275, Stars on the Move; 313, Model a Planet's Orbit **TE Only:** xlvi-xlvii, QUEST; 256, CCC: Patterns; 313d, Performance Expectation Activity; 313d, ELA/Literacy

Observable features of the student performance by the end of the grade:		
1	Organizing data	
	a	Using graphical displays (e.g., bar graphs, pictographs), students organize data pertaining to daily and seasonal changes caused by the Earth's rotation and orbit around the sun. Students organize data that include:
		i. The length and direction of shadows observed several times during one day.
		ii. The duration of daylight throughout the year, as determined by sunrise and sunset times.
		iii. Presence or absence of selected stars and/or groups of stars that are visible in the night sky at different times of the year.
2	Identifying relationships	
	a	Students use the organized data to find and describe* relationships within the datasets, including:
		i. The apparent motion of the sun from east to west results in patterns of changes in length and direction of shadows throughout a day as Earth rotates on its axis.
		ii. The length of the day gradually changes throughout the year as Earth orbits the sun, with longer days in the summer and shorter days in the winter.
		iii. Some stars and/or groups of stars (i.e., constellations) can be seen in the sky all year, while others appear only at certain times of the year.
	b	Students use the organized data to find and describe* relationships among the datasets, including:
		i. Similarities and differences in the timing of observable changes in shadows, daylight, and the appearance of stars show that events occur at different rates (e.g., Earth rotates on its axis once a day, while its orbit around the sun takes a full year).

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

5-ESS2-1 Earth's Systems

Students who demonstrate understanding can:

5-ESS2-1. **Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [*Assessment Boundary: Assessment is limited to the interactions of two systems at a time.*]
Chapter 5 Performance Expectation Activity, 313a

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop a model using an example to describe a scientific principle. (5-ESS2-1) **SE/TE:** 198, Try It!; 200-203, STEM Activity; 224, Explore It!; 313, Landforms and Weather **TE Only:** 197, SEP: Developing and Using Models; 207, Differentiated Instruction; 214, Differentiated Instruction; 229a, Explore It!; 313a, Performance Expectation Activity; 313a, ELA/Literacy	**ESS2.A: Earth Materials and Systems** • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1) **SE/TE:** 4-7, STEM Activity; 206-207, The Water Cycle; 210-215, Lesson 2; 216-223, Lesson 3; 224, Explore It!; 228-229, Types of Clouds; 234, Bodies of Water; 252, Chapter Review – Lessons 1, 2, 3; 253, Chapter Review – Lesson 4; 254, Benchmark Practice – Question 2; 313, Landforms and Weather; 318-321, STEM Activity	**Systems and System Models** • A system can be described in terms of its components and their interactions. (5-ESS2-1),(5-ESS3-1) **SE/TE:** 206-207, The Water Cycle; 211, The Earth as a System **TE Only:** 196, CCC: Systems and System Models; 313a, Performance Expectation Activity; 313a, ELA/Literacy; 313a, Mathematics

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5	
	TE Only: 198, Teacher Background; 209, Professional Development Note; 215a, My Planet Diary; 215b, Lesson 2 Check – Questions 1-6; 229a, Explore It!; 229b, Lesson 4 Check – Questions 5, 6; 253a, Chapter 5 Test – Questions 3, 5; Chapter 5 Test – Question 9; 313a, Performance Expectation Activity; 313a, ELA/Literacy	

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a model, using a specific given example of a phenomenon, to describe* ways that the geosphere, biosphere, hydrosphere, and/or atmosphere interact. In their model, students identify the relevant components of their example, including features of two of the following systems that are relevant for the given example:
		i. Geosphere (i.e., solid and molten rock, soil, sediment, continents, mountains).
		ii. Hydrosphere (i.e., water and ice in the form of rivers, lakes, glaciers).
		iii. Atmosphere (i.e., wind, oxygen).
		iv. Biosphere (i.e., plants, animals [including humans]).
2	Relationships	
	a	Students identify and describe* relationships (interactions) within and between the parts of the Earth systems identified in the model that are relevant to the example (e.g., the atmosphere and the hydrosphere interact by exchanging water through evaporation and precipitation; the hydrosphere and atmosphere interact through air temperature changes, which lead to the formation or melting of ice).
3	Connections	
	a	Students use the model to describe* a variety of ways in which the parts of two major Earth systems in the specific given example interact to affect the Earth's surface materials and processes in that context. Students use the model to describe* how parts of an individual Earth system:
		i. Work together to affect the functioning of that Earth system.
		ii. Contribute to the functioning of the other relevant Earth system.

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

5-ESS2-2 Earth's Systems

Students who demonstrate understanding can:

5-ESS2-2. **Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.** [*Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.*]

Chapter 5 Performance Expectation Activity, 313b

See also Grade 4, Lesson 6.5.

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematics and Computational Thinking Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions. • Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2) **SE/TE:** 178-179, Investigate It!; 209, Do the Math; 213, Do the Math! **TE Only:** 179a-179c, Activity Card Support; 313a, Mathematics; 313b, Performance Expectation Activity; 313b, ELA/Literacy	**ESS2.C: The Roles of Water in Earth's Surface Processes** • Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2) **SE/TE:** 206-207, The Water Cycle; 212, Atmosphere; 213, Hydrosphere; 213, Lightning Lab; 234, Bodies of Water; 238-239, Water Erosion and Deposition **TE Only:** 196C, Teacher Background; 196G-196H, Leveled Content Reader Support; 206, Common Misconception; 213, Differentiated Instruction; 313b, Performance Expectation Activity	**Scale, Proportion, and Quantity** • Standard units are used to measure and describe physical quantities such as weight and volume. (5-ESS2-2) **SE/TE:** 214, Calculate; 260-263, STEM Activity; 312, Rain Gauge; 339, Tools; EM1, Measurements **TE Only:** 313a, Mathematics; 313b, Performance Expectation Activity

Observable features of the student performance by the end of the grade:		
1	Representation	
	a	Students graph the given data (using standard units) about the amount of salt water and the amount of fresh water in each of the following reservoirs, as well as in all the reservoirs combined, to address a scientific question:
		i. Oceans.
		ii. Lakes.
		iii. Rivers.
		iv. Glaciers.
		v. Ground water.
		vi. Polar ice caps.
2	Mathematical/computational analysis	
	a	Students use the graphs of the relative amounts of total salt water and total fresh water in each of the reservoirs to describe* that:
		i. The majority of water on Earth is found in the oceans.
		ii. Most of the Earth's fresh water is stored in glaciers or underground.
		iii. A small fraction of fresh water is found in lakes, rivers, wetlands, and the atmosphere.

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

5-ESS3-1 Earth and Human Activity

Students who demonstrate understanding can:

5-ESS3-1. **Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**
Chapter 4 Performance Expectation Activity, 195d

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1) **SE/TE:** 176, Go Green!; 195, Local Resources **TE Only:** 176, 21st Century Learning; 177, Science – Writing; 180, Science Notebook; 195d, Performance Expectation Activity; 195d, ELA/Literacy; 196G-196H, Leveled Content Reader Support; 215, 21st Century Learning; 313a, Performance Expectation Activity; 313a, ELA/Literacy; 313a, Mathematics	**ESS3.C: Human Impacts on Earth Systems** • Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1) **SE/TE:** 169, Changes Caused by Humans; 174-177, Lesson 4; 178-179, Investigate It!; 187, Chapter Review – Lesson 4; 188, Benchmark Practice; 189, Create a Compost Pile; 195, Local Resources **TE Only:** 142D, Teacher Background; 142G-142H, Leveled Content Reader Support; 173a, My Planet Diary; 177a, Explore It!; 177b, Lesson 4 Check – Questions 5, 6; 179a-179d, Activity Card Support; 195d, Performance Expectation Activity; 195d, ELA/Literacy; 215, 21st Century Learning	**Systems and System Models** • A system can be described in terms of its components and their interactions. (5-ESS2-1),(5-ESS3-1) **SE/TE:** 206-207, The Water Cycle; 211, The Earth as a System **TE Only:** 196, CCC: Systems and System Models; 313a, Performance Expectation Activity; 313a, ELA/Literacy; 313a, Mathematics ---------- ***Connections to Nature of Science*** **Science Addresses Questions About the Natural and Material World** • Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1) **SE/TE:** 174, Explore It!; 178-179, Investigate It!; 195, Local Resources; 316, Try It! **TE Only:** 177a, Explore It!; 179a-179d, Activity Card Support; 195d, Performance Expectation Activity

Observable features of the student performance by the end of the grade:		
1	Obtaining information	
	a	Students obtain information from books and other reliable media about:
		i. How a given human activity (e.g., in agriculture, industry, everyday life) affects the Earth's resources and environments.
		ii. How a given community uses scientific ideas to protect a given natural resource and the environment in which the resource is found.
2	Evaluating information	
	a	Students combine information from two or more sources to provide and describe* evidence about:
		i. The positive and negative effects on the environment as a result of human activities.
		ii. How individual communities can use scientific ideas and a scientific understanding of interactions between components of environmental systems to protect a natural resource and the environment in which the resource is found.

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

3-5-ETS1-1 Engineering Design

Students who demonstrate understanding can:

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Chapter 2 Performance Based Assessment, 98

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) **Grade 5 SE/TE:** 4, Identify the Problem; 56, Identify the Problem; 104, Identify the Problem; 146, Identify the Problem; 200, Identify the Problem; 260, Identify the Problem; 318, Identify the Problem; 364, Identify the Problem; 383, Identify the Problem; 398, Identify the Problem **Grade 5 TE Only:** 315: SEP: Asking Questions and Defining Problems	**ETS1.A: 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 compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1) **Grade 5 SE/TE:** 4-7, STEM Activity; 56-59, STEM Activity; 104-107, STEM Activity; 146-149, STEM Activity; 200-203, STEM Activity; 260-263, STEM Activity; 318-321, STEM Activity; 364-367, STEM Activity; 381-385, Design Process; 398-403, Design It!	**Influence of Science, Engineering, and Technology on Society and the Natural World** • People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) **Grade 5 SE/TE:** 363, Technology and Our Homes; 368-369, Envision it!; 369-373, Lesson 1; 374-379, Lesson 2; 386-387, Designing Robotic Arms; 390, Denim Insulation; 394, Chapter Review – Lessons 1, 2 **Grade 5 TE Only:** 373b, Lesson 1 Check – Questions 1-6; 379a, My Planet Diary; 379b, Lesson 2 Check – Questions 1-6

Observable features of the student performance by the end of the grade:		
1	Identifying the problem to be solved	
	a	Students use given scientific information and information about a situation or phenomenon to define a simple design problem that includes responding to a need or want.
	b	The problem students define is one that can be solved with the development of a new or improved object, tool, process, or system.
	c	Students describe* that people's needs and wants change over time.
2	Defining the boundaries of the system	
	a	Students define the limits within which the problem will be addressed, which includes addressing something people want and need at the current time.
3	Defining the criteria and constraints	
	a	Based on the situation people want to change, students specify criteria (required features) of a successful solution.
	b	Students describe* the constraints or limitations on their design, which may include:
		i. Cost.
		ii. Materials.
		iii. Time.

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

3-5-ETS1-2 Engineering Design

Students who demonstrate understanding can:

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Chapter 4 Performance Based Assessment, 195

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions 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. • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2) **Grade 5 SE/TE:** 4-7, STEM Activity; 56-59, STEM Activity; 104-107, STEM Activity; 146-149, STEM Activity; 200-203, STEM Activity; 260-263, STEM Activity; 318-321, STEM Activity; 364-367, STEM Activity; 381-385, Design Process; 398-403, Design It! **Grade 5 TE Only:** 361, SEP: Constructing Explanations and Designing Solutions	**ETS1.B: 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. (3-5-ETS1-2) **Grade 5 SE/TE:** 4-5, Do Research; 56-57, Do Research; 104-105, Do Research; 146, Do Research; 200, Do Research; 260-261, Do Research; 318-319, Do Research; 364-365, Do Research; 382, Do Research; 399, Do Research • 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. (3-5-ETS1-2) **Grade 5 SE/TE:** 385, Communicate Results **Grade 5 TE Only:** 5, Pre-Activity Discussion; 6, Post-Activity Discussion; 57, Pre-Activity Discussion; 58, Post-Activity Discussion; 105, Pre-Activity Discussion; 106, Post-Activity Discussion; 147,	**Influence of Science, Engineering, and Technology on Society and the Natural World** • Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2) **Grade 5 SE/TE:** 359, Flight Simulators; 361, Predict; 363, Technology and Our Homes; 369, Problems and Solutions; 370-371, Tools in Medicine; 374, My Planet Diary; 375-377, Technology and the Human Body; 378, Animals and Technology; 379, Nanobots; 381-385, Design Process; 386-387; 390, Denim Insulation; 394, Chapter Review – Lesson 2; 395, Chapter Review – Lesson 3; 396, Benchmark Practice – Questions 2, 3, 5; 397, Infrared Technology **Grade 5 TE Only:** 360G-360H, Leveled Content Reader Support; 360, CCC: Influence of Engineering, Technology, and Science on Society and the Natural World; 379a, My Planet Diary; 379b, Lesson 2 Check

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5	
	Pre-Activity Discussion; 148, Post-Activity Discussion; 201, Pre-Activity Discussion; 202, Post-Activity Discussion; 261, Pre-Activity Discussion; 262, Post-Activity Discussion; 319, Pre-Activity Discussion; 320, Post-Activity Discussion; 365, Pre-Activity Discussion; 366, Post-Activity Discussion	

Observable features of the student performance by the end of the grade:		
1	Using scientific knowledge to generate design solutions	
	a	Students use grade-appropriate information from research about a given problem, including the causes and effects of the problem and relevant scientific information.
	b	Students generate at least two possible solutions to the problem based on scientific information and understanding of the problem.
	c	Students specify how each design solution solves the problem.
	d	Students share ideas and findings with others about design solutions to generate a variety of possible solutions.
	e	Students describe* the necessary steps for designing a solution to a problem, including conducting research and communicating with others throughout the design process to improve the design [note: emphasis is on what is necessary for designing solutions, not on a step-wise process].
2	Describing* criteria and constraints, including quantification when appropriate	
	a	Students describe*:
		i. The given criteria (required features) and constraints (limits) for the solutions, including increasing benefits, decreasing risks/costs, and meeting societal demands as appropriate.
		ii. How the criteria and constraints will be used to generate and test the design solutions.
3	Evaluating potential solutions	
	a	Students test each solution under a range of likely conditions and gather data to determine how well the solutions meet the criteria and constraints of the problem.
	b	Students use the collected data to compare solutions based on how well each solution meets the criteria and constraints of the problem.

Iowa Science Standards, Foundation Boxes and Evidence Statements	Interactive Science, ©2016 Grade 5

3-5-ETS1-3 Engineering Design

Students who demonstrate understanding can:

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Part 2 Performance Based Assessment, 404

The performance expectations above were developed using the following elements from the NRC document *A Framework for K- 12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3) **Grade 5 SE/TE:** 4-7, STEM Activity; 56-59, STEM Activity; 104-107, STEM Activity; 146-149, STEM Activity; 200-203, STEM Activity; 260-263, STEM Activity; 318-321, STEM Activity; 364-367, STEM Activity; 381-385, Design Process; 398-403, Design It!	**ETS1.B: Developing Possible Solutions** • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) **Grade 5 SE/TE:** 6, Test the Prototype; 59, Test the Prototype; 106, Test the Prototype; 148, Test the Prototype; 202, Test the Prototype; 262-263, Test the Prototype; 320, Test the Prototype; 366, Test the Prototype; 384, Test the Prototype **ETS1.C: Optimizing the Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3) **Grade 5 SE/TE:** 7, Evaluate and Redesign; 59, Evaluate and Redesign; 106-107, Evaluate and Redesign; 149, Evaluate and Redesign; 203, Evaluate and Redesign; 263, Evaluate and Redesign; 321, Evaluate and Redesign; 367, Evaluate and Redesign; 385, Evaluate and Redesign; 403, Evaluate and Redesign	

Observable features of the student performance by the end of the grade:		
1	Identifying the purpose of the investigation	
	a	Students describe* the purpose of the investigation, which includes finding possible failure points or difficulties to identify aspects of a model or prototype that can be improved.
2	Identifying the evidence to be address the purpose of the investigation	
	a	Students describe* the evidence to be collected, including:
		i. How well the model/prototype performs against the given criteria and constraints.
		ii. Specific aspects of the prototype or model that do not meet one or more of the criteria or constraints (i.e., failure points or difficulties).
		iii. Aspects of the model/prototype that can be improved to better meet the criteria and constraints.
	b	Students describe* how the evidence is relevant to the purpose of the investigation.
3	Planning the investigation	
	a	Students create a plan for the investigation that describes* different tests for each aspect of the criteria and constraints. For each aspect, students describe*:
		i. The specific criterion or constraint to be used.
		ii. What is to be changed in each trial (the independent variable).
		iii. The outcome (dependent variable) that will be measured to determine success.
		iv. What tools and methods are to be used for collecting data.
		v. What is to be kept the same from trial to trial to ensure a fair test.
4	Collecting the data	
	a	Students carry out the investigation, collecting and recording data according to the developed plan.