TRUMBULL PUBLIC SCHOOLS

Trumbull, Connecticut

KINDERGARTEN SCIENCE
2017

(Last revision date: 2005)

Curriculum Writing Team

Floria N. Mallozzi, Ed.D. **Coordinator of STEM K-8**

Kory Buswell **Kindergarten Teacher**
Courtney Forde **Kindergarten Teacher**
Michele Molloy **Kindergarten Teacher**
Joanna Rosen **Kindergarten Teacher**

Jonathan S. Budd, Ph.D., Assistant Superintendent of Curriculum, Instruction, & Assessments

Kindergarten Science
Table of Contents

CORE VALUES AND BELIEFS

The Trumbull School Community engages in an environment conducive to learning which believes that all students will **read** and **write effectively**, therefore communicating in an articulate and coherent manner. All students will participate in activities **that present problem-solving through critical thinking**. Students will use technology as a tool applying it to decision making. We believe that by fostering self-confidence, self-directed and student-centered activities, we will promote **independent thinkers and learners**. We believe **ethical conduct** to be paramount in sustaining the welcoming school climate that we presently enjoy.

Approved 8/26/2011

INTRODUCTION & PHILOSOPHY

The Connecticut State Board of Education, based on its 2008 Position Statement on Science Education, has supported "a systematic approach to ensuring that every student in Connecticut receives a rich and coordinated PK-12 education in science. Science learning should focus simultaneously on developing an understanding of core concepts, as well as knowing how scientists work collaboratively to test ideas, analyze evidence, and solve problems. The realization of this vision is critical for our students' futures, as well as for Connecticut's place in the globally competitive economy."

The Board offers five principles to support strong elementary grades science education:

- "Ensure that the instructional focus for science is comparable to that provided for language arts and mathematics and teachers are able to integrate literacy and numeracy instruction within the context of students' science learning experiences."
- "Maintain class sizes that ensure instructional excellence and the safety of the students and the teacher."
- "Provide indoor and outdoor science learning areas, including rooms with flat, movable desks or tables and chairs, appropriate science equipment, storage space, and access to water and electricity as needed."
- "Provide students with multiple opportunities every week to experience inquiry investigations that develop students' abilities to question, explore, observe, gather simple data, create graphs, draw conclusions based on the data, and build their understanding of natural phenomena."
- "Provide science enrichment opportunities to foster student interest in science."

In 2015, the Connecticut State Board of Education adopted the Next-Generation Science Standards (NGSS), which embody the National Research Council's *Framework for K-12 Education* (2011). The TPS Kindergarten science curriculum integrates the NGSS as listed for each unit of study. The NGSS architecture uses Science and Engineering Practices along with various components of Disciplinary Core Ideas and Crosscutting Concepts to comprise the performance expectations for students. Based on the NRC *Framework*, a core idea for science education should meet at least two of the following four criteria:

- "Have broad importance across multiple sciences or engineering disciplines or be a key organizing principle of a single discipline."
- "Provide a key tool for understanding or investigating more complex ideas and solving problems."
- "Relate to the interests and life experiences of students or be connected to societal or personal concerns that require scientific or technological knowledge."
- "Be teachable and learnable over multiple grades at increasing levels of depth and sophistication."

The TPS Kindergarten science curriculum also follows the TPS guidelines for student safety in the classroom as represented in the National Science Education Standards, the Next-Generation Science Standards, the National Science Teachers Association, and OSHA. The curriculum encourages and fosters a hands-on, process and inquiry-based approach to science education, with student safety first and foremost. Lab safety guidelines are implemented through the district.

The curriculum is designed to be implemented within the parameters established by Trumbull Board of Education Policy 6112.2, "Allotment of Time for Subjects, Grades K-5."

COURSE GOALS

The course goals derive from the 2013 Next-Generation Science Standards and the 2010 Connecticut Core Standards. Goals are listed specific to each unit in this curriculum guide, and developed through unit lessons using the 5-E learning model (engage, explore, explain, elaborate, evaluate) in order to encourage student engagement and foster metacognitive learning strategies through a reflective process.

COURSE ENDURING UNDERSTANDINGS

Students will understand that . . .

- Scientists and engineers use many practices as they explore, investigate, design and build models, develop theories, and explain systems about the world.
- Weather conditions affect what we do, what we wear, and how we feel. Weather also affects animals and plants in our environment. The sun affects how warm the Earth's surface becomes.
- The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull.
- Plants and animals have predictable characteristics at different stages of development. All animals need food in order to live, grow, and change. Adult plants and animals can have young.
- Animals have body parts that capture and convey different kinds of information needed for growth and survival – for example, eyes for light, ears for sounds, and skin for temperature or touch. Animals respond to these inputs with behaviors that help them survive (e.g., finding food, running from a predator).

- Young animals are very much, but not exactly, like their parents and also resemble other animals of the same kind. Individuals of the same kind of plant or animal are recognizable, but can also vary in many ways.
- Living things can survive only where their needs are met. If some places are too hot or too cold or have too little water or food, plants and animals may not be able to live there.
- Humans use natural resources for everything they do: for example, they use soils and water to grow food, wood to burn to provide heat or to build shelters, and materials such as iron or copper extracted from Earth to make cooking plans.
- Things that people do to live comfortably can affect the world around them. But people can make choices that reduce their impacts on the land, water, air, and other living things, for example by reducing trash through reuse and recycling.

COURSE ESSENTIAL QUESTIONS

- How is scientific knowledge created and communicated?
- What does the sun do for us?
- In what ways do objects move? (e.g., zigzag, straight, round and round, back and forth, fast and slow)
- How do we change the way in which an object moves? (e.g., by pushing or pulling)
- How do organisms interact with their living and nonliving environments to obtain matter and energy?
- How do humans depend on Earth's resources?
- How can individuals of the same species, and even siblings, have different characteristics?
- How do organisms live, grow, respond to their environments, and reproduce?

COURSE KNOWLEDGE & SKILLS

Students will understand, at an age-appropriate level, . . .

- Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.
- Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.

- Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.
- Systems and system models. Defining the system under study – specifying its boundaries and making explicit a model of that system – provides tools for understanding and testing ideas that are applicable throughout science and engineering.
- Energy and matter: Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.
- Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
- Stability and change. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

Students will be able to . . .

- ask questions (for science) and define problems (for engineering).
- develop and use models.
- plan and carry out investigations.

SCIENCE YEAR AT A GLANCE

September – early October	Unit 1: Introduction to Scientific Practices and Inquiry-Based Learning
mid October – November	Unit 2: Earth's Systems: Weather and Environmental Impact
December – mid January	Unit 3: Motion and Stability: Forces and Interactions: Push and Pull
late January – February	Unit 4: Molecules to Organisms: Animal Shelters
March	Unit 5: Earth and Human Activity: Human Impact
April – June	Unit 6: Molecules to Organisms: Structure and Processes: Life Cycle

UNIT 1
Introduction to Scientific Practices and Inquiry-Based Learning

Unit Goals

At the completion of this unit, students will:

NGSS.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.
NGSS.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.
NGSS.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.
CCS.ELA-Literacy.RI.K.1	With prompting and support, ask and answer questions about key details in a text.
CCS.ELA-Literacy.W.K.6	With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers.
CCS.ELA-Literacy.W.K.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
CCS.ELA-Literacy.SL.K.5	Add drawings or other visual displays to descriptions as desired to provide additional detail.
CCS.MP.2	Reason abstractly and quantitatively.
CCS.MP.4	Model with mathematics.
CCS.MP.5	Use appropriate tools strategically.
CCS.K.MD.A.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

CCS.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.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems: • Ask questions based on observations to find more information about the natural and/or designed world(s). (NGSS.K-2-ETS1-1) • Define a simple problem that can be solved through the development of a new or improved object or tool. (NGSS.K-2-ETS1-1) Developing and Using Models: • Develop a simple model based on evidence to represent a proposed object or tool (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard). (NGSS.K-2.ETS1-2) Analyzing and Interpreting Data: • Analyze data from tests of an object or tool to determine if it works as intended (i.e., collecting, recording, and sharing observations). (NGSS.K-2-ETS1-3)	ETS1.A: Defining and Delimiting Engineering Problems: • A situation that people want to change or create can be approached as a problem to be solved through engineering. (NGSS.K-2-ETS1.A) • Asking questions, making observations, and gathering information are helpful in thinking about problems. (NGSS.K-2-ETS1.A) • Before beginning to design a solution, it is important to clearly understand the problem. (NGSS.K-2-ETS1.A) ETS1.B: Developing Possible Solutions: • 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. (NGSS.K-2-ETS1.B) ETS1.C: Optimizing the Design Solution: • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (NGSS.K-2-ETS1.C)	Structure and Function: • The shape and stability of structures of natural and designed objects are related to their function(s). (NGSS.K-2-ETS1-2)

Unit Essential Questions

- How is scientific knowledge created and communicated?
- Who are scientists?
- What makes "science" science?
- What are science tools?
- How can we use science tools to help us better understand our world?
- What are the five senses?
- Which body organ is associated with each sense?
- How do we use our senses to make observations?

Scope and Sequence

- Scientists are people who carefully observe, record, make hypotheses, test, and draw conclusions.
- Science tools, such as magnifiers, graduated cylinders, measuring tools, balances, pipettes, notebooks, etc., are used to make observations and record data.
- Humans have five senses that they use to observe their environment. A specific organ is associated with each sense.
- Senses can be used to investigate nature all around us.

Assured Assessments

Formative Assessments:

- monitoring during Turn & Talk
    - Five Senses
    - "using senses"
- discussions of observations from centers
- discussions and reflection on K-W-L chart
- directed and informal teacher observations during investigations
- whole-group check-in discussions
- ongoing Science Notebook entries: responses and recordings
    - Hanger Activity Sheet
    - "Senses in Our Classroom" or "Senses All Around" worksheets

Summative Assessments:

- Assessment #1: "Amazing Scientists"
- Assessment #2: "Cool Tools"
- Assessment #3: "Your Senses"

Resources

- Readers:
    - *Scientists* by Pamela Chanko and Samantha Berger
    - *Science Outside* by Susan Canizares and Betsey Chessen
    - *Science Tools* by Susan Canizares and Betsey Chessen

    - *Our Senses* by Adrienne Betz
    - *My Five Senses* by Aliki
    - *See, Hear, Touch, Taste, Smell* by Melvin Berger
- Student Science Notebooks
- Lesson activities as outlined in Unit 1: Lesson 1 – *Scientists*; Lesson 2 – *Science Tools*; Lesson 3 – *Our Five Senses*; and Lesson 4 – *Making Observations Using Our Senses*
- Additional teacher resources as provided in teacher manual
- Interactive SMARTBoard lessons referenced in lesson outlines
- Digital resources as referenced in lessons
- Calendar Math – integrated learning
- Science and math manipulatives as listed in lesson outlines

Time Allotment

- Approximately five weeks (September – early October)

UNIT 2
Earth's Systems: Weather and Environmental Impact

Unit Goals

At the completion of this unit, students will:

NGSS.K-2-ESS2-1	Use and share observations of local weather conditions to describe patterns over time.
NGSS.K-2-ESS2-2	Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
CCS.ELA-Literacy.RI.K.1	With prompting and support, ask and answer questions about key details in a text.
CCS.ELA-Literacy.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.
CCS.ELA-Literacy.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.
CCS.ELA-Literacy.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).
CCS.ELA-Literacy.SL.K.5	Add drawings or other visual displays to descriptions as desired to provide additional detail.
CCS.MP.2	Reason abstractly and quantitatively.
CCS.MP.4	Model with mathematics.
CCS.K.CC.A	Know number names and the count sequence.

CCS.K.MD.A.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
CCS.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.
CCS.K.MD.B.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data: • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (NGSS.K-ESS2-1) Engaging in Argument from Evidence: • Construct an argument with evidence to support a claim. (NGSS.K-ESS2-2) Planning and Carrying Out Investigations: • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (NGSS.K-PS3-1) Constructing Explanations 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. (NGSS.K-PS3-2)	PS3.B: Conservation of Energy and Energy Transfer: • Sunlight warms Earth's surface. (NGSS.K-PS3.B) ESS2.D: Weather and Climate: • 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. (NGSS.K-ESS2.D) ESS2.E: Biogeology: • Plants and animals can change their environment. (NGSS.K-ESS2.E) ESS3.C: Human Impacts on Earth Systems: • Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other	Patterns: • Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (NGSS.K-ESS2-1) Systems and System Models: • Systems in the natural and designed world have parts that work together. (NGSS.K-ESS2-2) Cause and Effect: • Events have causes that generate observable patterns. (NGSS.K-PS3-1, NGSS.K-PS3-2)

Connections to Nature of Science: Science Knowledge Is Based on Empirical Evidence: • Scientists look for patterns and order when making observations about the world. (NGSS.K-ESS2-1) Scientific Investigations Use a Variety of Methods: • Scientists use different ways to study the world. (NGSS.K-PS3-1)	living things. (NGSS.K-ESS3.C)	

Unit Essential Questions

- What does the sun do for us?
- What tools/items are used to minimize the warming effect of the sun in a certain area?
- What is weather?
- Does weather have patterns that can be observed?
- What are seasons?
- How does weather change with the seasons?
- How does weather impact our lives?
- How does weather influence the clothes we wear?
- How does weather influence whether we play outside or not?

Scope and Sequence

- The sun warms the earth's surface.
- Shade protects objects from the heat of the sun.
- Weather has patterns that can be observed.
- Seasons can bring observable weather changes and temperatures.
- What we need to wear depends on the type of weather that is occurring.
- Weather impacts our lives.

Assured Assessments

Formative Assessments:

- informal teacher observations during investigations
- whole-group check-in discussions
- center discussions
- monitoring during Turn & Talk

- reflections on K-W-L Chart; pair/share group
- observations and recordings in Science Notebook

Summative Assessments:

- Assessment #1: In Science Notebooks, instruct students to draw themselves wearing appropriate clothing for a cold, windy fall day. Those students who are able should label their drawings.
- Assessment #2: In Science Notebooks, extension of "Will the wind blow it?" page; written response with teacher support
- Assessment #3: In Science Notebooks, fold one page in half, then draw a picture of a tree that has leaves in the summer as compared to the same tree in the fall. Label as appropriate.
- Culminating assessment at the end of Unit 2, Week 4: "What activities do you do in each season?"

Resources

- Readers*:*
  - *Our Sun, Our Weather* by Nancy White
  - *The Four Seasons* by Melvin Berger
  - *Who Cares about the Weather?* by Melvin Berger
- Student Science Notebooks
- Lesson activities as outlined in Unit 2: Lesson 1 – *The Sun and Its Energy*; Lesson 2 – *Weather*; Lesson 3: *How Do Weather Patterns Change Throughout The Year?*; Lesson 4 – *Environmental Impacts.*
- Additional teacher resources as provided in teacher manual
- Interactive SMARTBoard lessons referenced in lesson outlines
- Digital resources as referenced in lessons
- Calendar Math: temperature
- Science and math manipulatives as listed in lesson outlines

Time Allotment

- Approximately six weeks (mid October – November)

UNIT 3
Motion and Stability: Forces and Interactions: Push and Pull

Unit Goals

At the completion of this unit, students will:

NGSS.K-2-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.
NGSS.K-2-PS2-2	Analyze data to determine if a design solution works as intended to change the speed or directions of an object with a push or a pull.
CCS.ELA-Literacy.RI.K.1	With prompting and support, ask and answer questions about key details in a text.
CCS.ELA-Literacy.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).
CCS.ELA-Literacy.SL.K.3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
CCS.MP.2	Reason abstractly and quantitatively.
CCS.K.MD.A.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
CCS.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.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations: • Make observations (firsthand or from media) to collect data that can be used to make comparisons.	PS2.A: Forces and Motions: • Pushes and pulls can have different strengths and directions. (NGSS.K-PS2-2) • Pushing or pulling on an	Cause and Effect: • Simple tests can be designed to gather evidence to support or refute student ideas about causes. (NGSS.K-PS2-1, NGSS.K-

(NGSS.K-PS3-1) Analyzing and Interpreting Data: • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (NGSS.K-ESS2-1) Connections to Nature of Science: Scientific Investigations Use a Variety of Methods: • Scientists use different ways to study the world. (NGSS.K-PS3-1)	object can change the speed or direction of its motion and can start or stop it. (NGSS.K-PS2-2) PS2.B: Types of Interactions: • When objects touch or collide, they push on one another and can change motion. (NGSS.K-PS2-1) PS3.C: Relationship between Energy and Forces: • A bigger push or pull makes things speed up or slow down more quickly. (secondary to NGSS.K-PS2-1) ETS1.A: Defining Engineering Problems: • 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. (secondary to NGSS.K-PS2-2)	PS2-2)

Unit Essential Questions

- In what ways do objects move? (e.g., zigzag, straight, round and round, back and forth, fast and slow)
- How do we change the way in which an object moves? (e.g., by pushing or pulling)

Scope and Sequence

- Students begin building an understanding of how the building pieces of a ramp are part of a system.
- Students explore how different things move, patterns of movement, and the force it takes to make objects move, stop, or change direction.
- Students use dominoes to explore the result of force transferred from one object to another, the energy of the push being transferred from one domino to the next.

- Students build a toy top that spins, then use the toy top to explore force and the motion of spinning.
- Students construct a model (an invention, Rube Goldberg style) that is set in motion with force.

Assured Assessments

Formative Assessments:

- informal teacher observations during investigations
- whole-group check-in discussions
- center discussions
- monitoring during Turn & Talk
- reflections on K-W-L Chart; pair/share group
- observations and recordings in Science Notebook
- Optional with each lesson: Observational-based Assessment (OBA) Sheets: OBA #1: *Push, Pull, Roll*; OBA #2: Push, Pull, Swing; OBA #3: *Push, Pull, Tumble;* OBA #4: *Spinning Tops*

Summative Assessments:

- Assessment #1 (2 sheets): Student Activity Sheets 1B, "What I Built," and 1C, "How Far?"
- Assessment #2: Student Activity Sheet 2: "Push, Pull, Swing"
- Assessment #3: Student Activity Sheet 3: "Dominoes and a Push"
- Assessment #4: Student Activity Sheet 4: "Spinning Tops"
- Assessment #5: Student Activity Sheet 5A: "My Invention"
- Culminating assessment at the end of Unit 3: Student Activity Sheet 5B: "Force and Motion Assessment Sheet"

Resources

- Building Blocks of Science Literacy Series: *Push, Pull, Go* – Carolina Biological STC Module (STEM-based learning module)
- Readers*:*
  - *Where Is It? Is It Moving?* by Delta Science First Readers
  - *Oscar and the Cricket: A Book about Moving and Rolling* by Geoff Waring
  - *Motion: Push and Pull, Fast and Slow* by Darlene R. Stille
  - Building Blocks of Science Literacy Series: *Push! Pull! Go!* Big Book Student
  - *Spinning: First Step Nonfiction* by Sara E. Hoffmann
- Student Science Notebooks
- Lesson activities as outlined in Unit 2: Lesson 1 – *Ramps*; Lesson 2 – *Swing*; Lesson 3: *Dominoes;* Lesson 4: *Spin;* Lesson 5: *Invent*
- Additional teacher resources as provided in teacher manual
- Interactive SMARTBoard lessons referenced in lesson outlines
- Digital resources as referenced in lessons
- Calendar Math – integrated learning

- Science and math manipulatives as listed in lesson outlines

Time Allotment

- Approximately eight weeks (December – mid January)

UNIT 4
Molecules to Organisms: Animal Shelters

Unit Goals

At the completion of this unit, students will:

NGSS.K.LS1-1	Use observations to describe patterns of what plants and animals (including humans) need to survive.
CCS.ELA-Literacy.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.
CCS.ELA-Literacy.SL.K.3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
CCS.ELA-Literacy.SL.K.5	Add drawings or other visual displays to descriptions as desired to provide additional detail.
CCS.MP.2	Reason abstractly and quantitatively.
CCS.MP.4	Model with mathematics.
CCS.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.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data: • Make observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (NGSS.K-LS1-1) Connections to Nature of Science: Scientific Investigations Use a Variety of Methods: • Scientists look for patterns and order when making	LS1.C: Organization for Matter and Energy Flow in Organisms: • All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (NGSS.K-LS1-1)	Patterns: • Patterns in the natural and human designed world can be observed and used as evidence. (NGSS.K-LS1-1)

observations about the world. (NGSS.K-LS1-1)		

Unit Essential Questions

- How do organisms interact with their living and nonliving environments to obtain matter and energy?
- How does the environment influence adaptations in populations of organisms over multiple generations?
- What are characteristics of living things (animals and humans), and how can they be grouped?
- What do humans need to survive?
- What types of shelters do humans need?
- Does weather/climate affect the types of shelters needed by humans?
- What do animals need to survive?
- Why are some shelters good for some animals but not for others?

Scope and Sequence

- Students begin building an age-appropriate understanding of grouping and sorting living things by characteristics. Living things grow, need air/water/food to survive, and make living things like themselves.
- Living things depend on the land, water, and air to live and grow. They in turn can change their environments, such as the shape of their land, the flow of water, the types of shelters for an area.
- Wind and water can change the shape of the land. The resulting landforms, together with the materials on the land, provide homes for living things.
- Living things can survive only where their needs are met.
- All animals, including humans, need shelters/homes/habitats, but different animals have different shelters/homes/habitats because they have different climate needs, food needs, and shelter needs.

Assured Assessments

Formative Assessments:

- informal teacher observations during investigations
- whole-group check-in discussions
- center discussions
- monitoring during Turn & Talk
- reflections on K-W-L Chart; pair/share group
- observations and recordings in Science Notebook

Summative Assessments:

- Assessment #1: “Living vs. Nonliving” worksheet in Science Notebook
- Assessment #2: “Wants/Needs” (“I want . . .”/“I need . . .”) worksheet in Science Notebook
- Assessment #3: “Your Home”
- Assessment #4: “Climate Shelter”
- Assessment #5: “Animal Habitat/Homes Sort” worksheet in Science Notebook

Resources

- Readers*:*
  - *Alive or Not Alive* by Anne Milton
  - *Grouping Living Things* by Judith Rosenbaum
  - *Is It Alive?* by Marcia S. Freeman
  - *Homes around the World* by Dona Herweck Rice
- Student Science Notebooks
- Additional teacher resources as provided in teacher manual
  - https://www.pebblego.com/login/ to read aloud, and discuss, the article “Homes around the World”
- Interactive SMARTBoard lessons referenced in lesson outlines
- Digital resources as referenced in lessons: for example, https://www.brainpopjr.com for video “Wants and Needs”
- Calendar Math – integrated learning
- Science and math manipulatives as listed in lesson outlines

Time Allotment

- Approximately five weeks (late January – February)

UNIT 5
Earth and Human Activity: Human Impact

Unit Goals

At the completion of this unit, students will:

NGSS.K.ESS3-1	Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
NGSS.K.ESS3-2	Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
NGSS.K.ESS3-3	Communicate solutions that will reduce the impact of humans on the land, water, air, and /or other living things in the local environment.
CCS.ELA-Literacy.RI.K.1	With prompting and support, ask and answer questions about key details in a text.
CCS.ELA-Literacy.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.
CCS.ELA-Literacy.SL.K.3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
CCS.ELA-Literacy.SL.K.5	Add drawings or other visual displays to descriptions as desired to provide additional detail.
CCS.MP.2	Reason abstractly and quantitatively.
CCS.MP.4	Model with mathematics.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems: • Ask questions based on observations to find more information about the designed world. (NGSS.K-ESS3-2)	ESS3.A: Natural Resources: • 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	Cause and Effect: • Events have causes that generate observable patterns. (NGSS.K-ESS3-2, NGSS.K-ESS3-3) Systems and System Models:

Developing and Using Models: • Use a model to represent relationships in the natural world. (NGSS.K-ESS3-1) Obtaining, Evaluating, and Communicating Information: • Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (NGSS.K-ESS3-2) • Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (NGSS.K-ESS3-3)	everything they do. (NGSS.K-ESS3-1) ESS3.B: Natural Hazards: • 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. (NGSS.K-ESS3-2) ESS3.C: Human Impacts on Earth Systems: • Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (NGSS.K-ESS3-3) ETS1.A: Defining and Delimiting an Engineering Problem: • Asking questions, making observations, and gathering information are helpful in thinking about problems. (secondary to NGSS.K-ESS3-2) ETS1.B: Developing Possible Solutions: • 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. (secondary to NGSS.K-ESS3-3)	• Systems in the natural and designed world have parts that work together. (NGSS.K-ESS3-1) Connections to Engineering, Technology, and Applications of Science: Interdependence of Science, Engineering, and Technology: • People encounter questions about the natural world every day. (NGSS.K-ESS3-2) Influence of Engineering, Technology, and Science on Society and the Natural World: • People depend on various technologies in their lives; human life would be very different without technology. (NGSS.K-ESS3-2)

Unit Essential Questions

- How do humans depend on Earth's resources?
- How do natural hazards affect individuals and societies?
- How do humans change the planet?
- What are natural resources?
- How can severe weather damage a natural resource?
- How can humans reduce/reuse/recycle to help the Earth's water, land, air, and other living things?
- How is Earth Day related to humans' impact on Earth?

Scope and Sequence

- Students begin building an age-appropriate understanding of natural resources.
- Students identify and list natural resources.
- Students explore the effects of severe weather damage on natural resources.
- Human activities in everyday life have major effects on water, land, air, and ever outer space. Communities of people do things to help protect Earth's resources and environments.
- Students begin building an age-appropriate understanding of reasons to celebrate the Earth.
- Students design an activity that will contribute to Earth Day.

Assured Assessments

Formative Assessments:

- informal teacher observations during investigations
- whole-group check-in discussions
- center discussions
- monitoring during Turn & Talk
- reflections on K-W-L Chart; pair/share group
- observations and recordings in Science Notebook
- completed tornado worksheet in Science Notebook

Summative Assessments:

- Assessment #1: "My Book of Natural Resources and Products" mini-pattern book completed individually
- Assessment #2: "Tornado Observations" worksheet in Science Notebook
- Assessment #3: "Sorting Trash" worksheet in Science Notebook
- Culminating assessment at the end of Unit 5: "Help My Earth" partner poster

Resources

- Readers*:*
  - *What Are Natural Resources?* by Bruce Larkin

- *Michael Recycle* by Ellie Bethel
- *The Lorax* by Dr. Seuss: http://viewpure.com/8V06ZOQuo0k?ref=search
- *Natural Resources* by Bruce Larkin
- *What Is Severe Weather?* by Jennifer Boothroyd
- *10 Things I Can Do To Help My World* by Melanie Walsh
- *The EARTH Book* by Todd Parr

- Student Science Notebooks
- Additional teacher resources as provided in teacher manual
- Interactive SMARTBoard lessons referenced in lesson outlines: for example, "Betsy's Kindergarten Adventures"
- Digital resources as referenced in lessons: for example, http://viewpure.com/Qw6uXh9yM54?start=0&end=0 for video "Natural Resources of the Earth"
- Calendar Math – integrated learning
- Science and math manipulatives as listed in lesson outlines

Time Allotment

- Approximately three weeks (March)

UNIT 6
Molecules to Organisms: Structure and Processes: Life Cycle

Unit Goals

At the completion of this unit, students will:

NGSS.K.LS1-1	Use observations to describe patterns of what plants and animals (including humans) need to survive.
NGSS.1.LS3-1	Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
NGSS.1.LS1-1	Use materials to design a solution to a human problem.
NGSS.K.PS3.2	Use tools and materials provided to design and build a device that solves a specific problem.
NGSS.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.
CCSS.ELA-Literacy.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.
CCSS.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.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data: • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (NGSS.K-LS1-1) Developing and Using Models: • Develop a simple model based on evidence to	LS3.A: Inheritance of Traits: • Young animals are very much, but not exactly, like their parents. Plants are also very much, but not exactly, like their parents. (NGSS.1-LS3-1) LS3.B: Variation of Traits: • Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many	Patterns: • Patterns in the natural and human designed world can be observed and used as evidence. (NGSS.K-LS1-1) Structure and Function: • The shape and stability of structures of natural and designed objects are related to their function(s). (NGSS.K-2-ETS1-2)

represent a proposed object or tool. (NGSS.K-2-ETS1-2) Connections to Nature of Science: Scientific Knowledge Is Based on Empirical Evidence: • Scientists look for patterns and order when making observations about the world. (NGSS.K-LS1-1) Constructing Explanations and Designing Solutions: • Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (NGSS.1-LS3-1)	ways. (NGSS.1-LS3-1) LS1.B: Growth and Development of Organisms: • Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (NGSS.1-LS1-2) LS1.C: Organization for Matter and Energy Flow in Organisms: • All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (NGSS.K-LS1-1)	

Unit Essential Questions

- How can individuals of the same species, and even siblings, have different characteristics?
- How do organisms live, grow, respond to their environments, and reproduce?
- What special needs do baby animals have?
- What types of things could happen if we are not careful with an egg, chick, or other animal for which we are caring?
- How are baby chickens born?
- What happens to a fertilized egg once it begins to incubate?
- If the mother hen does not nest on the egg, how else can the egg incubate?
- How does a baby chick resemble its mother?
- Once a chick is born, what kinds of things does it need to grow up healthy?

Scope and Sequence

- Students understand the importance of carefully observing and caring for fertilized eggs and baby chicks in the classroom. (Observations last 21 incubation days, plus 1 week of growth and development.)
- Students identify chickens as living things.

- Students identify and sequence the life cycle of baby chicks.
- Students learn life-cycle vocabulary of "egg," "chick," "adult," "rooster," and "hen."
- Students participate in building a safe classroom habitat for chicks.

Assured Assessments

Formative Assessments:

- informal teacher observations during investigations
- whole-group check-in discussions
- center discussions
- monitoring during Turn & Talk
- reflections on K-W-L Chart; pair/share group
- observations and recordings in Science Notebook

Summative Assessments:

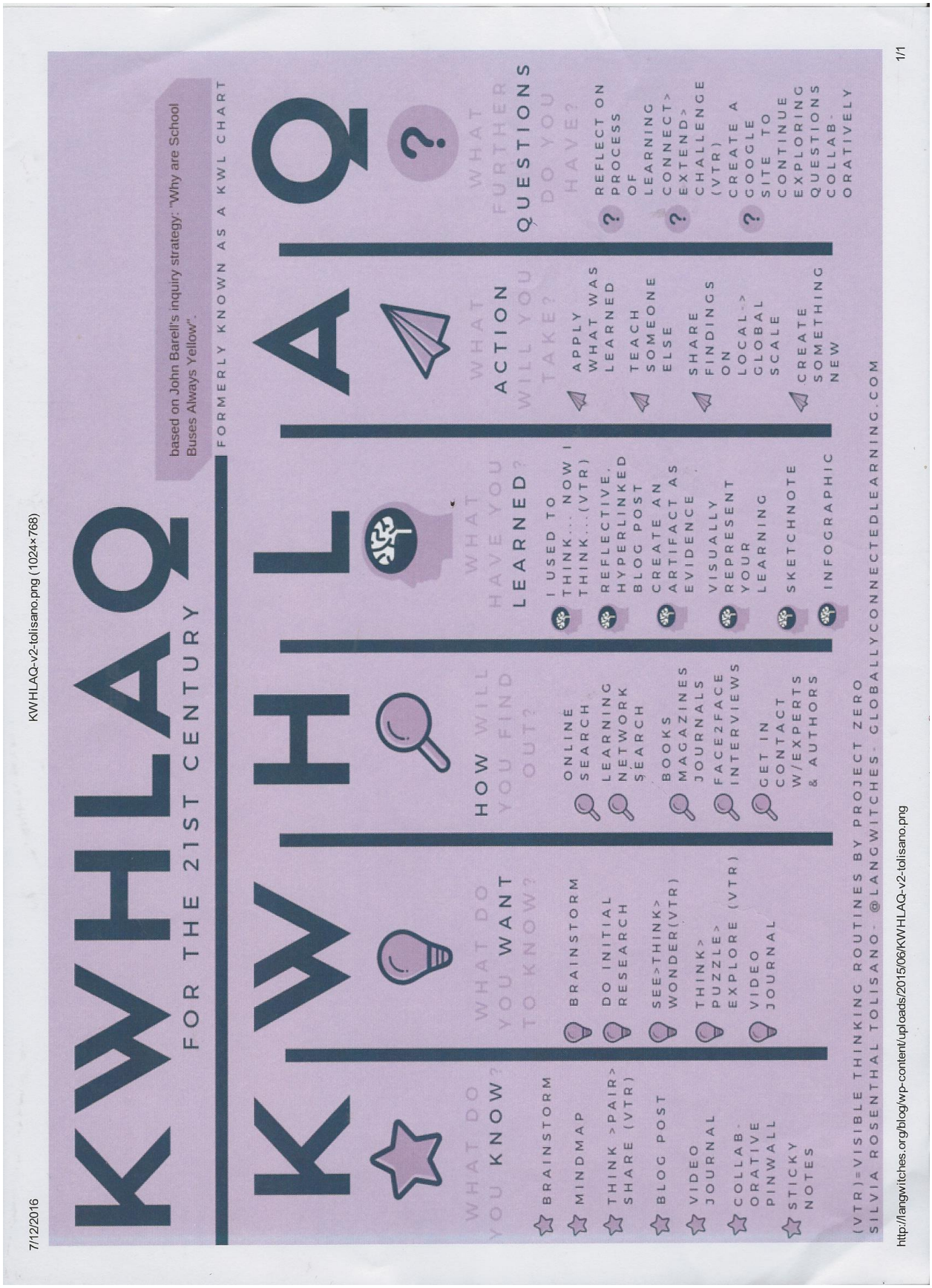
- Assessment #1: "Designing and Planning a Habitat"
- Chick test: Does your hatchling stay inside your habitat safely?

Resources

- Readers*:*
  - *From Egg to Chicken* by Dr. Gerald Scrace Legg
  - *Chickens Aren't the Only Ones* by Ruth Heller
- Student Science Notebooks
- Additional teacher resources as provided in teacher manual
  - Chicken Life Cycle poster chart
  - *Chick Life Cycle* (Science Vocabulary Readers)
  - *The Life Cycle of a Chicken* (Blastoff Readers)
- Interactive SMARTBoard lessons referenced in lesson outlines: for example, "Chick Master"
- Digital resources as referenced in lessons: for example:
  - https://jr.brainpop.com/science/beascientist/makingobservations/ for video "Making Observations"
  - iHatch app tool on iPads
- Hova Bator incubators and automatic turners
- STEM Chick Shelter Habitat materials: DUPLO blocks, LEGO blocks, MANGO blocks, MAGNA tile blocks
- Calendar Math – integrated learning
- Science and math manipulatives as listed in lesson outlines

Time Allotment

- Approximately eight weeks (April – June)


7/12/2016
KWHLAQ-v2-tolisano.png (1024×768)
KWHLAQ
FOR THE 21ST CENTURY
FORMERLY KNOWN AS A KWL CHART
based on John Barell's inquiry strategy: "Why are School Buses Always Yellow".
K
WHAT DO YOU KNOW?
BRAINSTORM
MINDMAP
THINK >PAIR> SHARE (VTR)
BLOG POST
VIDEO JOURNAL
COLLAB. ORATIVE PINWALL
STICKY NOTES
W
HOW WILL YOU FIND OUT?
WHAT DO YOU WANT TO KNOW?
BRAINSTORM
DO INITIAL RESEARCH
SEE>THINK> WONDER(VTR)
THINK> PUZZLE> EXPLORE (VTR)
VIDEO JOURNAL
H
WHAT HAVE YOU LEARNED?
ONLINE SEARCH
LEARNING NETWORK SEARCH
BOOKS MAGAZINES JOURNALS
FACE2FACE INTERVIEWS
GET IN CONTACT W/EXPERTS & AUTHORS
I USED TO THINK... NOW I THINK...(VTR)
REFLECTIVE, HYPERLINKED BLOG POST
CREATE AN ARTIFACT AS EVIDENCE
VISUALLY REPRESENT YOUR LEARNING
SKETCHNOTE
INFOGRAPHIC
L
WHAT WILL YOU TAKE ACTION?
APPLY WHAT WAS LEARNED
TEACH SOMEONE ELSE
SHARE FINDINGS ON LOCAL-> GLOBAL SCALE
CREATE SOMETHING NEW
A
WHAT FURTHER QUESTIONS DO YOU HAVE?
REFLECT ON PROCESS OF LEARNING
CONNECT> EXTEND> CHALLENGE (VTR)
CREATE A GOOGLE SITE TO CONTINUE EXPLORING QUESTIONS COLLAB- ORATIVELY
Q
(VTR)=VISIBLE THINKING ROUTINES BY PROJECT ZERO
SILVIA ROSENTHAL TOLISANO - @LANGWITCHES - GLOBALLYCONNECTEDLEARNING.COM
http://langwitches.org/blog/wp-content/uploads/2015/06/KWHLAQ-v2-tolisano.png
1/1

ASSURED LESSON OUTLINES

Unit 1, Lesson 1 – Introduction to Scientific Processes and Inquiry-Based Learning

<table>
<tr><td>Grade: Kindergarten</td><td>Topic: Introduction to Scientific Processes and Inquiry-Based Learning</td><td>Lesson: Lesson 1 of 4
- approx. 4 class sessions duration</td></tr>
<tr><td colspan="3">Essential Questions:
Who is a scientist?
What makes SCIENCE science?</td></tr>
<tr><td colspan="3">Lesson Objectives:
Students will:
Begin an age-appropriate understanding of what a scientist is.
Begin an age-appropriate understanding of how to observe like a scientist.</td></tr>
<tr><td colspan="3">Lesson Plan – 5 E Model:</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">ENGAGE: Opening activity – access prior learning / stimulate interest / generate questions</td></tr>
<tr><td colspan="3">Session 1
Have students gather on the carpet. Use chart paper, or the SMARTBoard, to make a K-W-L chart based on “Who is a scientist?” and “What do scientists do?”
Ask students what they already Know about scientists; list their responses on the chart. Then ask students what they Want to know about what scientists do; again, record their responses on the chart.
Play “I Want To Be a Scientist” game found at http://pbskids.org/sid/scientist.html.</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">EXPLORE: Description – Materials needed / probing or clarifying questions / resources</td></tr>
<tr><td colspan="2">Scope & Sequence</td><td>Materials</td></tr>
<tr><td colspan="2">Session 2
Have students gather on the carpet. As a whole class, read Scientists by Pamela Chanko and Samantha Berger.
Facilitate discussion: “What other characteristics can be used to define and describe the role of a scientist?”
Record student responses on K-W-L chart</td><td>Session 2
Scientists, Pamela Chanko and Samantha Berger
Chart paper or SMARTBoard with “Scientist” K-W-L
Picture cards of types of scientists are available in the teacher packet</td></tr>
<tr><td colspan="2">Session 3
Have students gather on the carpet. As a whole class, read Science Tools by Susan Canizares and Betsey Chessen.
Conduct a discussion on how to observe like a scientist.
Take the class outside. Have students bring their Science Notebooks, colored pencils, and hand-held magnifiers, along with their observation</td><td>Session 3
Coat hangers – collect prior to lesson; if needed, you may have 1 observation hanger per 2 students
Science Tools, Susan Canizares and Betsey Chessen
Chart paper or SMARTBoard with “Scientist” K-W-L
Hanger Activity sheet in Science</td></tr>
</table>

hangers to observe a grassy area of their choice near the school. Instruct students to complete the Hanger Activity. [If class cannot go outside, set up the observation hanger ahead of time, and take a picture of the outside area to display on the SMARTBoard. The investigation can be completed as a whole class if weather conflicts arise.]	Notebook • Hand-held magnifiers
EXPLAIN: Concepts explained and vocabulary defined	
Scope & Sequence	**Concepts & Vocabulary**
Session 4 • Have students gather on the carpet. Complete the K-W-L chart as a class. Based on their investigations, "What have you **learned** about being scientists?" • Complete Assessment #1: "Amazing Scientists"	Session 4 • Scientists are people who carefully observe, record, make hypotheses, test, and draw conclusions. • One example of a scientist is a meteorologist. A meteorologist is a person who studies and predicts weather. • observe, look, watch, wait, property, investigation, test, explore, discover, write, record, meteorologist
ELABORATE: Applications and extensions	
• Read provided mentor texts; students can Turn & Talk and/or develop the K-W-L chart	
EVALUATE: Assured assessments	
Formative Assessments	**Summative Assessment**
Sessions 1-4 • monitoring during Turn & Talk • discussion of observations from Hanger Activity • discussions of K-W-L chart	Session 4 • Assessment #1: "Amazing Scientists"
ELABORATE FURTHER: Reflection / enrichment (optional)	
As you find necessary.	