"Our mission is to prepare each student to be a successful and responsible member of society."

North Smithfield School District

North Smithfield Scope and Sequence SCIENCE Curriculum: K-12

North Smithfield District Science Curriculum Committee
Clare Arnold, District Curriculum Director
Consultants: East Bay Educational Collaborative Science Specialist Team

Elementary Science Kindergarten through Fifth Grade

Elementary Science Curriculum Table of Contents (K-5)

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The **GOALS** of the North Smithfield Science Curriculum K-12 are to provide a guaranteed, viable, and sustainable comprehensive curriculum program in science that:

- ✓ Promotes and facilitates the attainment of the standards, by all students K-12, identified in the ***Rhode Island – NECAP Science Grade Span Expectations*** and the National Common Core State Standards for English Language Arts/Literacy for Science.
- ✓ Ensures that all students will have equal access to the highest quality instructional programs and teaching practices in science embedded with high expectations for all students.
- ✓ Facilitates scientific literacy for all students that is essential for all citizens of the 21st century as defined by both state and national standards.
- ✓ Enables all students to be prepared for the 21st century workplace.
- ✓ Engages students in *scientific inquiry* that promotes critical thinking, academic rigor, deeper content understanding, and problem solving skills.
- ✓ Clearly describes how classroom student progress is monitored through ***formative assessment*** including, but not limited to, the use of science notebooks by all students.
- ✓ Identifies how student achievement is monitored at each grade level by periodic common tasks and ***grade level summative assessments*** at strategic intervals during the academic year.
- ✓ Provides a model for regular discussions of student work products among teachers to provide continuous improvement of instruction and thus student achievement.
- ✓ Embeds a workshop based, student centered, model of instruction that addresses the State Common Core ELA-Literacy Science Standards utilizing a "claims/inference & evidence" approach as stated on page 5 of this document.

The recently released writing standards in the ***Common Core State Standards for Literacy in Science*** state that in order to achieve college and career readiness expectations, students need to be able to:

Write arguments focused on *discipline-specific content* that:

1. Introduces claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
2. Supports claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
3. Uses words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

To address the above standards the following model of instruction should be incorporated in full as often as possible. When time prevents the full pedagogical model to be implemented then, appropriate portions of it should be used to scaffold student competency and achievement of the "Scientific Inquiry" theme as described in the NECAP documents.

The Scientist's Notebook model includes the following components:

- **Formulating investigable questions** when given a scientific engaging problem or scenario
  Students K-12 should be provided opportunities to gradually gain competency in their abilities to communicate questions based on initial or prior observations. Students at all grades need to be provided essential or focus questions that are identified in this document to stimulate their inquiry investigations. As they progress to higher grades they need to become able to identify appropriate controls and the variable to be used for the investigation.
- **Making Predictions/Formulating Hypotheses**
- **Planning Investigations:** Inquiry investigations whenever possible should be a guided inquiry. "Cook book" procedures have their place when introducing new apparatus or when there is an overriding safety concern such as mixing chemicals by students or to help differentiate instruction whenever appropriate. When time permits students need to develop their own procedures for investigating phenomena.
- **Formulating Claims/Inferences from Evidence**
- **Making Meaning Conference:** Students need to communicate and defend their claims based on their evidence as scientists and be skeptical about evidence but, also open minded to alternative or contrary explanations.
- **Writing effective conclusions** based on student claims & evidence.
- **Incorporating and communicating reflections** on investigations that suggest alternative methods for investigations and other questions for more investigations

Elementary Science

Full Option Science Systems - FOSS currently is the core of the established instructional program used in the North Smithfield district in grades Kindergarten through Fifth. It is a research-based science curriculum used nationally and developed at the Lawrence Hall of Science, University of California at Berkeley. FOSS is also an ongoing research project dedicated to improving the learning and teaching of science. The FOSS project began over 20 years ago during a time of growing concern that our nation was not providing young students with an adequate science education. The FOSS program materials are designed to meet the challenge of providing meaningful science education for all students in diverse American classrooms and to prepare them for life in the 21st century. Development of the FOSS program was, and continues to be, guided by advances in the understanding of how youngsters think and learn. This curriculum document recognizes the need to focus emphasis where appropriate, on Rhode Island-NECAP Grade Span Expectations and related Assessment Targets but, also seeks to insure the integrity of the well researched FOSS program in developing conceptual understanding for students.

Full Option Science Systems (FOSS*) K-5 North Smithfield Science Kit Matrix

*Note: Many of the kits identified below do provide instruction that facilitates the connections between the broad Science Themes areas as identified by Rhode Island NECAP K-12 documents identified below. The NECAP themes identified are the primary focus of the FOSS kits identified. *Myself & Others-Kindergarten is a program developed by the Educational Development Center and the National Science Foundation

Grade		Life Science	Earth & Space Science	Physical Science
K-5	5	Environments	Landforms	Mixtures & Solutions
	4		Earth Materials	Matter & Energy
				Magnetism & Electricity
	3	Structures of Life	Water	Ideas & Inventions
	2	Insects	Pebbles, Sand, & Silt	Solids & Liquids
	1	New Plants	Air & Weather	Balance & Motion
	K	Animals 2X2 & Myself & Others*		*Myself & Others offers Physical Science Connections & Life Science Connections

Animals 2x2 Unit Design – Grade K

Animals Two by Two provides young students with close and personal interaction with some common land and water animals. Appropriate classroom habitats are established, and students learn to care for the animals. In four activities the animals are studied in pairs. Students observe and care for one animal over time, and then they are introduced to another animal similar to the first but with differences in structure and behavior. This process enhances opportunities for observation, communication, and comparison.

RI Statements of Enduring Knowledge - (Established Goals):

LS1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
LS1 (K-2) –1 **Students demonstrate an understanding of classification of organisms by …** **1a** distinguishing between living and non-living things. **1b** identifying and sorting based on similar or different external features. **1c** observing and recording the external features that make up living things (e.g. roots, stems, leaves, flowers, legs, antennae, tail, shell).	******LS1 (K-4) - INQ+POC –1*** *Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.* Investigation 1, Part 2, pp. 17-21 Investigation 4, Part 4, pp. 20-23 Science Stories, pp. 3-24 Investigation 1, Part 4, pp. 26-29 Investigation 2, Part 3, pp. 18-21 Investigation 4, Part 2, pp. 12-15 Science Stories, pp. 6-7, 10-11, 14-15, 19 Investigation 1, Part 1, 4, pp. 10-16, 26-29 Investigation 3, Part 1, pp. 8-12
LS1 (K-2)-2 **Students demonstrate understanding of structure and function-survival requirements by…** **2a** observing that plants need water, air, food, and light to grow; observing that animals need water, air, food and shelter to grow.	***LS1 (K-4) SAE -2*** *Identify the basic needs of plants and animals in order to stay alive. (i.e., water, air, food, space).* Investigation 1, Part 2, pp. 17-21 Investigation 4, Part 4, pp. 20-23

LS1 (K-2)–4 **Students demonstrate understanding of structure and function-survival requirements by…** **4a** identifying the specific functions of the physical structures of a plant or an animal (e.g. roots for water; webbed feet for swimming).	Science Stories, pp. 6-7, 12, 20 ***LS1 (K-4) FAF –4*** *Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire).* Investigation 1, Part 1, pp. 10-16 Investigation 2, Part 1, pp. 9-13 Investigation 3, Parts 1, 3, pp. 8-12, 17-20 Science Stories, pp. 5-6, 9-10, 17-18, 21
LS2 (K-2)-5 **Students demonstrate an understanding of energy flow in an ecosystem by …** **5a** caring for plants and/or animals by identifying and providing for their needs; experimenting with a plant's growth under different conditions, including light and no light	***LS2 (K-4) – SAE–5*** *Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy.* Investigation 1, Part 2, pp. 17-21 Investigation 4, Part 4, pp. 20-23 Science Stories, pp. 6-7, 12, 20
LS4 (K-2)-8 **Students demonstrate an understanding of human body systems by …**	***LS4 (K-4) – FAF–8*** *Identify what the physical structures of humans do (e.g., sense organs-eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals.* Investigation 1, Parts 1, 2-4, pp. 10-16, 22-29 Investigation 3, Parts 1, 3, pp. 8-12, 17-20
8a identifying the five senses and using senses to identify objects in the environment.	Investigation 1, Part 1, pp. 10-16 Investigation 2, Part 1, pp. 9-13 Investigation 3, Parts 1, 3, pp. 8-12, 17-20
8b observing, identifying and recording external features of humans and other animals	
8c identifying the senses needed to meet survival needs for a given situation.	Investigation 1, Part 3, pp. 22-25 Investigation 3, Part 2, pp. 13-16

Words in **bold** are important for science vocabulary development, and should be used for word walls.

Investigation-Time (45 min. periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1-(1)	The Structure of Goldfish	• What are the parts of goldfish?	Fish have identifiable **structures** All animals deserve respect and gentle care.
1.2-(1)	Caring for Goldfish	• What do goldfish need to live?	Fish have basic **needs** Fish change their **environment** Fish **behavior** is influenced by conditions in the environment
1.3-(1)	Goldfish Behavior	• What do goldfish do?	Fish **behavior** is influenced by conditions in the **environment** Fish have **senses** that help them detect objects in their environment
1.4-(1)	Comparing Goldfish to Guppies	• How are guppies and goldfish different? • How are they alike?	Each kind of fish has unique **structures** and **behavior** Different kinds of fish have similar **structures** and **behavior**
2.1-(2)	Land Snails	• What are the parts of a land snail? • What do land snails do?	Snails have identifiable **structures** Snails have **senses** Snails have basic **needs**
2.2-(1)	Snail Races	• What will get a snail to move?	Snail **behavior** is influenced by conditions in the **environment** All animals deserve respect and gentle care.
2.3-(1)	Observing Water Snails	• How are water snails and land snails different? • How are they the same?	Each kind of snail has unique **structures** and **behavior** Different kinds of snails have similar **structures** and **behavior**
2.4 -(1)	Shells	• How can shells be grouped?	There is a great **diversity** among shells
3.1-(1)	The Structure of Redworms	• What are the parts of a redworm?	Redworms have identifiable **structures** Redworms have basic **needs** All animals deserve respect and gentle care.
3.2-(1)	Redworm Behavior	• What do red worms do?	Worm **behavior** is influenced by conditions in the **environment**
3.3-(1)	Comparing Redworms to Night Crawlers	• How are red worms and night crawlers different? • How are they the same?	Each kind of worm has unique **structures** and **behavior** Different kinds of worms have similar **structures** and **behavior**
4.1-(1)	Isopod Observations	• What are isopods?	Isopods have identifiable **structures** and **behavior** All animals deserve respect and gentle care.
4.2-(1)	Identifying Isopods	• How are pill bugs and sow bugs different?	Each kind of isopod has unique **structures** and **behavior** Different kinds of isopods have similar **structure** and **behavior**
4.3-(1)	Isopod Races	• How do isopods move?	Isopod **behavior** is influenced by conditions in the **environment**
4.4-(1)	Animals Living Together	• What do animals need?	Animals have similar **needs**. They all need food, water, air and space

Investigation-Time (45 min. periods)	Investigation	Focus Questions (Essential Questions)	Big Ideas (Understandings)
5.1-(1)	Setting the Eggs	• What do eggs need to hatch into chicks?	Eggs require certain environmental conditions to hatch

Myself & Others Unit Design - Grade K

Myself & Others focuses children's attention on their physical characteristics. They look at themselves and their classmates; they gather information about characteristics such as height, eye color, and hand size; they explore similarities, differences, and variations. Thus, children will become aware that although each of them is unique, they all share many similar characteristics.

RI Statements of Enduring Knowledge - (Established Goals):

LS1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

LS 4- Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
LS4 (LS1 (K-2) –1 **Students demonstrate an understanding of classification of organisms by …** **1b** identifying and sorting based on a similar or different external features. **K-2) –8** **LS4 (K-2)-8** **Students demonstrate an understanding of human body systems by …** **8a** identifying the five senses and using senses to identify objects in the environment, **LS4 (K-2) –9** **Students demonstrate an understanding of human heredity by …** **9a** observing and comparing their physical features with those of parents, classmates and other organisms. **PS1 (K-2)–1** **Students demonstrate an understanding of characteristic properties of matter by …** **1a** identifying, comparing, and sorting objects by similar or different physical properties (e.g., size, shape, color, texture, smell, weight).	******LS1 (K-4) - INQ+POC –1*** *Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.* ***PS1 (K-4) INQ –1*** *Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility).*

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Investigation-Time (45 min. periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1--(1)	Introduction to Myself & Others	• What characteristics can be used to describe people?	Using language to describe **characteristics** of oneself and others
2-(1)	Alike & Different	• What are shared physical characteristics? • What characteristics are unique to the individual?	Introduction to **classify**ing. **Sorting** and **categorize** Introduction **to graphs -charts**
3-(1)	Body Outlines	• What parts make up all people's bodies? (**Legs, arms, torso**)	Explore and observe Identifying from an outline the person **represented**
4-(1)	Measuring Height	• How are the **heights** of classmates different? • How do we measure height?	Measure heights using paper strips **Organizing information**
5-(1)	Our hands	• How do hands vary among individual people? • What uses do we have for hands?	Form and function of hands
6-(1)	Handfuls	• How can we measure hand **capacity**?	Form and function Classifying hands Graphing handfuls
7-(1)	Our Eyes	• Are all eyes of people the same?	Careful **observation** Classifying Starting to construct conclusions based on relationships
8-(1)	Our Hair	• Are there variations in people's hair?	Careful **observation** Classifying Starting to construct conclusions based on relationships
9-(1)	Our Skin	• Is there a variation in the texture of different people's skin? • Are all fingerprints alike?	Careful **observation** Classifying Starting to construct conclusions based on relationships
10-(1)	The color of our skin?	• Is there variation in people's skin color?	Compare and describe skin color Attempting to represent skin colors
11-(1)	Time	• Assessment activity	
12-(1)	Past, present & future	• How does a person's growth change the way they look?	Predicting

Air and Weather Unit Design - Grade 1

The **Air and Weather Module** consists of four sequential investigations, each designed to introduce concepts in earth science. The investigations provide opportunities for young students to explore the natural world by using simple tools to observe and monitor change.

RI Statements of Enduring Knowledge - (Established Goals):
LS 2 Matter cycles and energy flows through an ecosystem
ESS 1 The Earth and earth materials as we know them today have developed over long periods of time, through continual change processes
PS 1 All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another *(independent of size or amount of substance)*

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence
ESS 1(K-2)–3 Students demonstrate an understanding of how the use of scientific tools helps to extend senses and gather data by… **3a** using scientific tools to extend senses and gather data about weather (e.g., weather/wind vane: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter sticks/rulers: snow depth; rain gauges: rain amount in inches). **ESS 1(K-2)-4 Students demonstrate an understanding of processes and change over time within earth systems …** **4a** observing and recording seasonal and weather changes throughout the school year.	******ESS 1 (K-4) NOS –3*** *Explain how the use of scientific tools helps to extend senses and gather data about weather. (i.e., weather/wind vane: direction; wind sock: wind intensity; anemometer: speed; thermometer: temperature; meter sticks/rulers: snow depth; rain gauges: rain amount in inches).* Investigation 2, Parts 2, 4, pp. 14-19, 24-27 Investigation 3, Parts 2, 4, pp. 12-16, 22-27 ******ESS1 (K-4) INQ+SAE –4*** *Explain how wind, water, or ice shape and reshape the earth.* Investigation 2, Part 1, pp. 8-13 Investigation 4, Parts 1-2, pp. 8-11

Related Rhode Island GSE's (Understandings)	RI Assessment Targets Assessment Evidence
ESS 1 (K-2)-5 Students demonstrate an understanding of processes and change over time within earth systems by … **5a** observing, recording, and summarizing local weather data. **5b** observe how clouds are related to forms of precipitation (e.g., rain, sleet, snow). **ESS 2 (K-2)-7 Students demonstrate an understanding of temporal or positional relationships between or among the Earth, sun, and moon by …** **7a** observing that the sun can only be seen in the daytime, but the moon can be seen sometimes at night and sometimes during the day. **7b** observing that the sun and moon appear to move slowly across the sky. **7c** observing that the moon looks slightly different from day to day. **9a** observing that there are more stars in the sky than can easily be counted, but they are not scattered evenly and not all the same in brightness. **PS2 (K-2)-4** **Students demonstrate an understanding of energy by…** **4c** identifying the sun as a source of heat energy.	****ESS1 (K-4) POC –5*** *Based on data collected from daily weather observations, describe weather changes or weather patterns.* Investigation 2, Part 1, pp. 8-13 Investigation 4, Parts 1-2, pp. 8-11 Investigation 2, Part 3, pp. 20-23 **No further targets for EK ESS2 at the** **K-4 Grade Span** ***PS2 (K-4) – SAE–4*** *Given a specific example or illustration (e.g., simple closed circuit, rubbing hands together), predict the observable effects of energy (i.e., light bulb lights, a bell rings, hands warm up (i.e. a test item might ask, "what will happen when….?)* Investigation 2, Part 2, pp. 14-19 Science Stories, p. 21

Related Rhode Island GSE's (Understandings)	RI Assessment Targets Assessment Evidence
PS2 (K-2)-6 **Students demonstrate an understanding of energy by…** **6a** describing that the sun warms land and water. **6b** describing that objects change in temperature by adding or subtracting heat. **PS3 (K-2)-7** **Students demonstrate an understanding of motion by…** **7a** showing how pushing and pulling moves or does not move an object. .	***PS2 (K-4) – SAE + INQ–6*** *Experiment, observe, or predict how heat might move from object to another.* Investigation 2, Part 2, pp. 14-19 Science Stories, p. 21 Investigation 2, Part 2, pp. 14-19 ****PS3 (K-4) – INQ + SAE–7*** *Use data to predict how a change in force (greater/less) might affect the position, direction of motion, or speed of an object (e.g., ramps and balls).* Investigation 1, Parts 4-5, pp. 21-33 Investigation 3, Part 3, pp. 17-21

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Investigation- Time (45 min. periods)	Investigation	Focus Questions (Essential Questions)	Big Ideas (Understandings)
1.1-(1)	Air is there.	How does air interact with objects?	• Air is something real and is called **matter**. • Air takes up **space**.
1.2-(1)	Air under water.	How can I keep paper towel dry under water?	• Air interacts with objects • Air is matter • Air can be captured.
1.3-(1)	Parachutes	How does air effect how a parachute floats to the ground?	• Air is all around objects • **Air resistance** affects how things move.
1.4-(1)	Pushing on Air.	What happens when I push air into a smaller space?	• Air is matter and takes up space • Air can be compressed • The pressure from compressed air can move things
1.5-(1)	Air and Water Fountain	How can I use air to push water around a system?	• Air is matter and takes up space • Air **pressure** can move water.
1.6-(1)	Balloon rockets	How can I use compressed air to propel a balloon rocket?	• Air can be compressed • The **pressure** from compressed air can move things
2.1-(ongoing)	Weather Calendars	How can we keep a record of daily weather conditions?	• **Weather** describes conditions in the air outside. • **Meteorologists** are scientists who study weather. • Scientific journals record what is observable
2.2-(1)	Measuring Temperature	How does a thermometer measure temperature?	• **Temperature** describes how hot or cold the air is. • Temperature is measured with a thermometer. • The unit used to measure temperature is **degrees** Celsius (°C) or degrees Fahrenheit (°F)

Investigation- Time (45 min. periods)	Investigation	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
2.3-(ongoing)	Watching clouds	Are all clouds the same? What kind of weather do different clouds bring?	• There are three main clouds. • **Clouds** are made of water drops • **Wind** moves clouds in the sky
2.4-(1)	Measuring Rain	How can we measure the amount of rain that falls?	• **Meteorologists** use rain gauges to measure how much rain or snow has fallen. • Natural sources of water include streams, rivers, lakes (fresh water), and the oceans (salt water)
3.1-(1)	Bubbles in the wind	How can bubbles be used to find out about wind speed and direction?	• Bubbles are filled with air • Wind is moving air. • Bubbles can show the changing direction and speed of the wind.
3.2-(1)	Wind Speed	How do people describe the strength of wind?	• **Meteorologists** use a wind scale to describe the strength of the wind • **Meteorologists** use anemometers to measure the speed of wind
3.3-(1)	Pinwheels	How can we use a pinwheel to observe the wind speed?	• A pinwheel provides evidence about how fast the wind is blowing
3.4-(1)	Wind Vanes	How can we use a wind vane to observe the direction of the wind?	• **Meteorologists** use wind vanes to observe wind direction • A wind vane points in the direction the wind is coming from
3.5-(1)	Kites	How can we use weather instruments to improve kite flying?	• Wind pushes a kite into the sky
4.1-(ongoing)	Weather graphs	How can we organize weather data collected for a month to look for change?	• **Weather** conditions change over time • **Weather** observations can be organized and used to make comparisons

Investigation- Time (45 min. periods)	Investigation	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
4.2-(ongoing)	Comparing seasons	How can we organize weather data taken over different seasons to look for change?	• Daily changes in **temperature**, **precipitation**, and weather type can be observed, compared and predicted • Each **season** has a typical **weather** pattern that can be observed, compared, and predicted • The **sun** can be seen only in the day. • The **sun** heats the **earth** during the day
4.3-(ongoing)	The night sky	What is the night sky and how can we monitor and record our observations to look for change?	• **Weather** occurs at night as well as during the day • The **moon** can be seen at night and sometimes during the day. It looks different every day but looks the same every four weeks • There are more **stars** in the sky than anyone can easily count • The **sun** and the **moon** move across the sky during the day and night and appear in different locations in the sky

Balance and Motion Unit Design – Grade 1

Balance & Motion shows we live in a dynamic world where everything is in motion, or so it seems. But not everything is moving the same way. Some things move from one place to another. Other things go around and around in a rotational motion. Still other things are stationary, stable for a time, balanced on a thin line between stop and go. These are the global phenomena that students experience in this module

Grade 1

RI Statements of Enduring Knowledge - (Established Goals):

PS 3 - The motion of an object is affected by forces.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
PS3 (K-2) –7 **Students demonstrate an understanding of motion by…** **7a** showing how pushing/pulling moves or does not move an object. **7b** predicting the direction an object will or will not move if a force is applied to it. **Students demonstrate an understanding of force by…** **7c** showing that different objects fall to earth unless something is holding them up. **PS3 (K-2)–8** **Students demonstrate an understanding of (**magnetic) **force by …** **8a** observing and sorting objects that are and are not attracted to magnets.	******PS3 (K-4)-INQ+SAE –7*** *Use data to predict how a change in force (greater/less) might affect the position, direction of ```motion, or speed of an object (e.g., ramps and balls).* Investigation 2, Parts 1-3, pp. 8-25 Investigation 1, Parts 1-4, pp. 8-28 Investigation 3, Parts 1-3, pp. 6-25 ***PS3 (K-4) INQ+ SAE –8*** *Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect)* Science Stories pp. 18-21

Words in **bold** are important for science vocabulary development, and should be used for word walls.

Investigation-Time (45 min.periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1-(3)	Trick Crayfish	• How many ways can a shape balance?	Objects can be **balanced** in many ways **Counterweights** can help balance an object The way an object can be **balanced** can be changed by counterweighting
1.2-(2)	Triangle and Arch	• How can counterweights help us balance other shapes?	A **stable** position is one that is steady; the object is not falling over The place on which an object balances is called the **balance point** **Counterweights** should be placed low or below an object in relation to the **balance point**
1.3-(1)	The Pencil Trick	• How can a pencil be balanced on its point?	**Counterweights** should be placed low or below an object in relation to the **balance point** The position of an object can be described by relating its location to another object
1.4-(2)	Mobiles	• How do the parts of a mobile stay in stable positions?	A mobile is a system of balanced beams and objects
2.1-(2)	Tops	• How can spinning tops be changed?	Objects and systems that turn on a central axis exhibit **rotational motion** You need a **force** to start a top spinning The amount and position of **mass** affect how the object **rotates**
2.2-(2)	Zoomers	• How can a spinning object be kept in motion?	There are different ways to initiate **rotational motion** The **motion** of an object can be changed by **pushing** or **pulling** Tops and zoomers both spin, but in different ways
2.3-(2)	Twirlers	• How did the different shapes make the twirler move?	Variations in design can influence the **rotational motion** of spinning objects **Air resistance** can act as the force that initiates **rotational motion**
3.1-(2)	Rolling Wheels	• How can a wheel and axle system be changed?	**Wheels** roll down a slope A slope is a surface that is higher on one end than another **Axles** support **wheels** **Wheel-and-axle systems** with **wheels** of different sizes roll toward the smaller **wheel**
3.2-(2)	Rolling Cups	• Can we predict the behavior of the rolling cup? • What happens if weight is added to a rolling cup system?	Cups roll in the direction of the smaller end To roll straight, two cups can be taped together so the ends are the same size The amount and location of an added weight can change the way a system rolls
3.3-(1)	Rolling Spheres	• How can we make a runway that will keep a marble rolling?	**Spheres** are round in all directions and roll in all directions A runway must be high at the start and low at the finish for a sphere to roll the complete length of the runway. Spheres roll down a slope

New Plants Unit Design – Grade 1

The **New Plants Module** provides experiences that heighten young students' awareness of the diversity of life in the plant kingdom. Students care for plants to learn what they need to grow and develop. They observe the structures of flowering plants and discover ways to propagate new plants from mature plants (from seeds, bulbs, roots, and stem cuttings). They observe and describe changes that occur as plants grow, and organize their observations on a calendar and in a journal.

RI Statements of Enduring Knowledge - (Established Goals):

LS1 – All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species)
LS2 – Matter cycles and energy flows through an ecosystem.
LS4 – Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence: *****High Emphasis Targets**
LS1 (K-2)-1Students demonstrate an understanding of classification of organisms by… **1a** distinguishing between living and non-living things. **1c** observing and recording the external features that make up living things (e.g., roots, stems, leaves, flowers, legs, antennae, tail, **LS1 (K-2)-2** **Students demonstrate an understanding of structure and function survival requirements by …** **2a** observing that plants need water, air, food, and light to grow; observe that animals need water, air, food and shelter to grow.	******LS1 (K-4) – INQ+POC –1*** *Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.* Investigation 1, Part 2, pp. 13-22 Investigation 3, Parts 1-3, pp. 8-25 Science Stories, pp. 3-43 Investigation 1, Part 3, pp. 23-30 Investigation 3, Parts 1-3, pp. 8-25 ******LS1 (K-4) – SAE–2*** *Identify the basic needs of plants and animals in order to stay alive. (i.e., water, air, food, space).* Investigation 1, Part 2, pp. 13-22 Science Stories, pp. 3-7

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence: *****High Emphasis Targets**
LS1 (K-2)-3 **Students demonstrate an understanding of reproduction by …** **3a** observing and scientifically drawing (e.g., recording shapes, prominent feature, relative proportions, organizes and differentiates significant parts observed) and labeling the stages in the life cycle of a familiar plant and animal.	**LS1 (K-4) – POC–3** *Predict, sequence or compare the life stages of organisms – plants and animals (e.g., put images of life stages of an organism in order, predict the next stage in sequence, compare two organisms).* Investigation 1, Part 3, pp. 23-30
LS1 (K-2)-4 **Students demonstrate an understanding of structure and function survival requirements by …** **4a** identifying the specific functions of the physical structures of a plant or an animal (e.g. roots for water; webbed feet for swimming).	**LS1 (K-4) – FAF–4** *Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire).* Investigation 1, Part 3, pp. 23-30 Science Stories, pp. 4-14, 23-24, 26-39
LS2 (K-2)-5 **Students demonstrate an understanding of energy flow in an ecosystem by …** **5a** caring for plants and/or animals by identifying and providing for their needs; experimenting with a plant's growth under different conditions, including light and no light.	**LS2 (K-4) – SAE–5** *Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy.* Investigation 1, Part 2, pp. 13-22 Investigation 2, Science Extension, p. 30 Science Stories, pp. 3-7 Video: How Plants Get Food
LS4 (K-2)-8 **Students demonstrate an understanding of human body systems by …** **8a** identifying the five senses and using senses to identify objects in the environment. **8b** observing, identifying and recording external features of humans and other animals **8c** identifying the senses needed to meet survival needs for a given situation	**LS4 (K-4) – FAF–8**** *Identify what the physical structures of humans do (e.g., sense organs-eyes, ears, skin, etc.) or compare physical structures of humans to similar structures of animals*. Investigation 3, Parts 1-3, pp. 8-25 Investigation 1, Part 3, pp. 23-30 Science Stories, pp. 23, 27, 30, 35

Insects Unit Design - Grade 2

The **Insects Module** provides experiences that heighten students' awareness of the diversity of animal forms. They come to know firsthand the life sequences of a number of insects. In each investigation an insect is introduced, and students observe structures and behaviors, discuss their findings, and ask questions. Students observe life cycles of insects and compare the stages of metamorphosis exhibited by each species.

RI Statements of Enduring Knowledge - (Established Goals):
LS 1 All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).
LS 3 Groups of organisms show evidence of change over time (structures, behaviors, and biochemistry).

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
LS1 (K-2) –1 **Students demonstrate an understanding of classification of organisms by …** **1a** distinguishing between living and non-living things. **1b** identifying and sorting based on similar or different external features. **lc** observing and recording the external features that make up living things (e.g. roots, stems, leaves, flowers, legs, antennae, tail, shell). **LS1 (K-2)-2** **Students demonstrate understanding of structure and function-survival requirements by…** **2a** observing that plants need water, air, food, and light to grow; observing that animals need water, air, food and shelter to grow.	******LS1 (K-4) - INQ+POC –1*** ***Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.*** Investigation 3, Part 2, pp. 12-20 Science Stories, pp. 3-34 Science Resources, pp. 3-55 Investigation 1, Part 2, pp. 16-25 Investigation 2, Part 2, pp. 14-19 Investigation 1, Parts 1-2, pp. 8-21 Investigation 4, Parts 3-4, pp. 19-27 ***LS1 (K-4) SAE -2*** *Identify the basic needs of plants and animals in order to stay alive. (i.e., water, air, food, space).* Investigation 1, Part 1, pp.8-15 Investigation 2, Part 1, pp. 8-13 Investigation 5, Part1, pp. 10-15

LS1 (K-2)–3 **Students demonstrate an understanding of reproduction by …** **3a** observing and scientifically drawing (e.g. recording shapes, prominent features, relative proportions, organizes and differentiates significant parts observed) and labeling the stages in the life cycle of a familiar plant and animal. **3b** sequencing the life cycle of a plant or animal when given a set of pictures.	***LS1 (K-4) POC –3*** *Predict, sequence or compare the life stages of organisms – plants and animals (e.g., put images of life stages of an organism in order, predict the next stage in sequence, compare two organisms*). Investigation 1, Parts 1-3, pp. 8-25 Investigation 2, Parts 1-3, pp. 8-24 Investigation 3, Parts 1-3, pp. 8-26 Investigation 4, Parts 1-5 pp. 10-31 Investigation 5, Parts1-3, pp. 10-24 Investigation 1, Part 3, pp. 22-25 Investigation 2, Part 3, pp. 20-24 Investigation 3, Part 3, pp. 21-26
LS1 (K-2)–4 **Students demonstrate understanding of structure and function-survival** **requirements by…** **4a** Identifying the specific functions of the physical structures of a plant or an animal (e.g. roots for water; webbed feet for swimming).	***LS1 (K-4) FAF –4*** *Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire)* Investigation 1, Parts 1-2, pp. 8-21 Investigation 2, Parts 1-2, pp. 8-19 Investigation 4, Parts 4-5, pp. 23-31 Science Stories, pp. 8-13

Words in **bold** are important for science vocabulary development, and should be used for word walls.

Investigation-Time (45 min.periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1-(2)	Mealworms	• What do insects (mealworms) need? • What are the structures and behaviors of mealworms?	• Insects need air, food water and space • Live **organisms** need to be treated with care and respect

1.2-(1)	Larva, Pupa, Adult	• How do mealworms grow and change? • What are the structures and behavior of mealworm larvae, pupae, adults?	• Insects have **characteristic structures and behaviors** • The **structures** of some insects change as the insect grows • As insects grow, they molt their hard, external covering • Adult insects have a **head, thorax and abdomen.**
1.3-(1)	Life Cycle	How do new mealworms begin?	• The **life cycle** of the beetle is egg, larva, pupa, and adult which produces eggs
2.1-(1)	Waxworms	• What are waxworms? • What do waxworms need?	• Insects need air, food water and space
2.2-(1)	Larva, Pupa, Adult	• How do waxworms grow and change? • What are the structures and behaviors of waxworms larvae, pupae, and adults?	• The **structure** and **behaviors** of waxworms change as they grow • Larvae produce silk • Waxworms and mealworms have similar **structures** and **behaviors**
2.3-(ongoing)	Life Cycle	• What is the life cycle of the waxworm?	• The **life cycle** of the waxworm is egg, larva, pupa, and adult moth which produces eggs
3.1-(ongoing)	Eggs	• How do insects (milkweed bugs) begin their life? • What do insects eggs look like?	• Insects hatch from eggs • Live **organisms** need to be treated with care and respect
3.2-(ongoing)	Habitats	• What do milkweed bugs need? • How do their need their needs compare to those of other insects?	• Needs of insects include air, food , water and space, and these are met in different ways for different insects
3.3-(ongoing)	Growing Milkweed Bugs	• What is the life cycle of the milkweed bug? • Do all insects go through larval and pupal stages? • How are all adult insects the same and different?	• As insects grow, they molt their hard external covering • Insects have three body parts: **head, thorax and abdomen** • Insects and other animals have different **structures** that help them grow and survive • The life cycle of some insects is egg, nymph stages, and adult, which produces eggs.
4.1-(1)	Eggs	• Do insects begin as eggs?	• Live **organisms** need to be treated with care and respect
4.2-(ongoing)	Larvae	• What do silkworms need to live?	• Insects hatch from eggs • Insects need air, food water and space
4.3-(ongoing)	Close Observations	• What are the structures and behaviors of silkworm larvae? • How do they compare to other insect larvae?	• Silkworms larvae have unique **behaviors** and **structures** • Larvae molt as they grow

Pebbles, Sand and Silt Unit Design – Grade 2

The **Pebbles, Sand, and Silt Module** consists of four sequential investigations, each designed to introduce concepts in earth science. The investigations provide experiences that heighten students' awareness of rocks as earth materials and natural resources. They will come to know rocks by many names and in a variety of sizes. Pebbles and sand are the same material—just different in size.

Grade 2

RI Statements of Enduring Knowledge - (Established Goals):

ESS1 - The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
ESS1 (K-2)–1 **Students demonstrate an understanding of earth materials by …** **1a** describing, comparing, sorting rocks and soils by similar or different physical properties (e.g., size, shape, color, texture, smell, weight). **1b** recording observations/ about physical properties. **1c** using attributes of properties to state why objects are grouped together (e.g., rocks that are shiny or not shiny).	******ESS1 (K-4) INQ –1*** ***Given certain earth materials (soils, rocks or minerals) use physical properties to sort, classify, and describe them.*** Investigation 1, Parts 1-5, pp. 8-29 Investigation 2, Parts 1-4, pp. 8-29 Investigation 4, Parts 1-3, pp. 8-25 Science Stories, pp. 3-9 Investigation1, Parts 2, 4, pp. 13-17, 22-25 Investigation 2, Parts 1-4, pp. 8-29 Investigation 4, Part 1, pp. 8-14 Investigation 1, Parts 3-4, pp. 18-25 Investigation 2, Part 2, pp. 14-17

ESS1 (K-2) –2 **Students demonstrate an understanding of processes and change over time within earth systems by …** **2a** conducting tests on how different soils retain water (e.g., how fast does the water drain through?).	******ESS1 (K-4) INQ –2*** ***Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves*).** Investigation 4, Home/School Connection, p. 28
ESS1 (K-2) –6 **Students demonstrate an understanding of properties of earth materials by…** **6a** identifying which materials are best for different uses (e.g., soils for growing plants, sand for the sand box).	***ESS1 (K-4) FAF -6*** *Given information about earth materials explain how their characteristics lend themselves to specific uses* Investigation 3, Parts -5, pp. 8-29 Science Stories, pp. 16-19, 24-25

Words in **bold** are important for science vocabulary development, and should be used for word walls.

Investigation-Time (45min. periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1-(1)	Three Rocks	• How are rocks different? • What happens when you rub rocks together?	**Rocks** have a variety of **properties** When rocks rub together, some (softer) rocks may be chipped or scratched, or make rock dust
1.2-(1)	Washing Three Rocks	• What happened when you washed the rocks?	**Rocks** have a variety of **properties** When rocks are washed in water, the colors or sparkling qualities are enhanced
1.3-(1)	First Sorting	• How can some rocks be the same?	**Rocks** can be sorted by their **properties**
1.4-(1)	Sorting Games	• How many ways can we sort rocks?	Rocks can be sorted by their **properties**
1.5-(ongoing)	Start A Rock Collection	• What kind of rocks can we find around us?	**Rocks** are all around us **Rocks** are the solid material of the earth
2.1-(1)	Screening River Rocks	• How can rocks be sorted by size?	Screens can be used to sort the sizes of **earth materials** Rock sizes include sand, small gravel, large gravel, small pebbles, and large pebbles

Investigation-Time (45min. periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
2.2-(1)	River Rocks By Size	• How else can rocks be sorted by size?	**Rocks** can be categorized visually by size **Rock** sizes include sand, small gravel, large gravel, small pebbles, and large pebbles **Rocks** larger than pebbles are cobbles **Rocks** larger than cobbles are boulders
2.3-(1)	Sand And Silt	• Is there an earth material smaller than sand?	Sand often contains smaller particles called silt Water can be used to sort the sizes of earth materials
2.4-(1)	Exploring Clay	• Is there an earth material smaller than silt?	Clay particles are very small, even smaller than silt
3.1-(1)	Rocks In Use	• How do people use earth materials?	**Earth materials** are natural resources The **properties** of **earth materials** make each suitable for specific uses **Earth materials** are commonly used in the construction of buildings and streets
3.2-(1)	Looking at Sandpaper	• What does sand do for sandpaper?	The **properties** of different **earth materials** make each suitable for specific uses Different sizes of sand are used in sandpaper to changes the surface of wood from rough to smooth
3.3-(1)	Sand Sculptures	• How else can sand be used?	The properties of different **earth materials** make each suitable for specific uses **Earth materials** are used to make sculptures
3.4-(1)	Clay Beads	• What can be made with clay?	The **properties** of different **earth materials** make each suitable for specific uses **Earth materials** are use to make jewelry and sculptures
3.5-(1)	Making Bricks	• How are bricks made?	The **properties** of different **earth materials** make each suitable for specific uses Simple bricks are made by combining clay soil with plant material
4.1-(1)	Homemade Soil	• What is in dirt?	**Soil** is a mixture of **earth materials** **Humus** is decayed material from plants and animals The ingredients of soil can be observed by mixing soil with water, shaking it, and letting it settle
4.2-(1)	Soil Search	• Are all soils the same?	**Soils** vary from place to place **Soils** have properties of color and texture Different **soils** differ in their ability to support plants
4.3-(ongoing)	Studying a Local Soil	• How are soils different?	**Soils** can be composed of humus and different amounts and sizes of **rocks**

Solids & Liquids Unit Design - Grade 2

The **Solids and Liquids Module** provides experiences that heighten students' awareness of the physical world. Matter with which we interact exists in three fundamental states: solid, liquid, and gas. In this module first and second graders have introductory experiences with two of these states of matter, solid and liquid.

RI Statements of Enduring Knowledge - (Established Goals):

PS1- All living and nonliving things are composed of matter having characteristics properties that distinguish one substance from another (independent of size or amount of substance).

PS3 – The motion of an object is affected by forces.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
PS1 (K-2)-1 **Students demonstrate an understanding of characteristic properties of matter by…** 1a identifying, comparing, and sorting objects by similar or different physical properties (e.g., size, shape, color, texture, smell, weight). 1b recording observations/data about physical properties. 1c using attributes of properties to state why objects are grouped together (e.g., things that roll, things that are rough). **PS1 (K-2)-2** **Students demonstrate an understanding of states of matter by…** 2a describing properties of solids and liquids.	******PS1 (K-4) – INQ–1*** ***Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, and flexibility).*** **Investigation 1**, Parts 1-2, pp. 8-20 **Investigation 2**, Parts 1-3, pp. 10-27 **Investigation 1**, Parts 1-2, pp. 8-20 **Investigation 2**, Parts 2-3, pp. 15-27 **Investigation 1**, Part 2, pp. 17-20 ***PS1 (K-4) – POC–2*** *Make a prediction about what might happen to the state of common materials when heated or cooled or categorize materials as solid, liquid, or gas.* **Investigation 1**, Parts 1-3, pp. 8-24 **Investigation 2**, Parts 1-3, pp. 10-27 **Science Stories**, pp. 3-13

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
2b identifying and comparing solids and liquids.	**Investigation 1**, Parts 1-3, pp. 8-24 **Investigation 2,** Parts 1-3, pp. 10-27 **Science Stories**, pp. 3-13 **Investigation 2**, Science Extension, p. 31 **Science Stories**, pp. 14-17 **FOSS Web, Activity**: Change It

Investigation-Time (45min. periods)	Investigation	Focus-Essential Questions	Big Ideas
1.1-(1)	Introduce Solids	• How can solids be described?	• Solids are one state of matter • Solid materials have properties that separate them from other states of matter • We use our senses to observe the properties of solids
1.2-(1)	Sort Solid Objects	• In what ways are some solids the same?	• Solids can be sorted by their properties • We use our senses to observe the properties of solids • Solid materials have properties that separate them from other states of matter
1.3-(1)	Construct With Solids	• How can the properties of solids be used?	• Solid materials have distinct uses based on their properties • Engineers are scientists who use their knowledge of materials to design useful objects and structures
2.1-(1)	Liquids In Bottles	• How do liquids differ from each other?	• Liquids are one state of matter. • Liquids have many properties. • Liquids pour and flow.
2.2-(1)	Properties Of Liquids	• How do liquids differ from each other?	• Liquids have many properties.

Investigation-Time (45min. periods)	Investigation	Focus-Essential Questions	Big Ideas
2.3-(1)	Liquid Levels	• How do liquids flow when a bottle is turned upside down? • How does the same amount of liquid look in carious shapes of containers? • In what ways are liquids the same?	• Liquids pour and flow. • Liquids take the shape of their container. • The surface of liquid is level with respect to the ground. • Solids and liquids have distinct properties that separate them as two states of matter
3.1-(1)	Solids In Containers	• Are these materials solid or liquid?	• Solid materials come in all sizes and shapes. • Particles of solid materials can pour like liquids, but maintain their shape. • Solid materials can support denser materials on their surface
3.2-(2)	Separating Soup Mix	• How can mixtures of solid particles be separated?	• Mixtures of solid particles can be separated with a screen • Solid materials come in all sizes and shapes.
3.3-(1)	Solids In Bottles	• How do particles of solids move in bottles?	• Senses of sight, hearing, and touch can be used to observe the properties of materials • Particles of solid materials can pour like liquids, but unlike liquids they maintain their shape. • The behavior of small solids has similarities to and differences from liquids
3.4-(1)	Separating Beads With A Screen	• How do you know which screens to use for separating a mixture of solids?	• Mixtures of solid particles can be separated with a screen.
4.1-(1)	Solids And Water	• What happens when different solids are mixed with water? • How can a mixture of water and solids be separated?	• Some solids change when mixed with water; other do not • Some solids dissolve in water; evaporation leaves the solid behind • Water can be separated from a mixture through evaporation
4.2-(1)	Liquids And Water	• What happens when water is mixed with different liquids?	• Some liquids mix with water • Some liquids forma layer above or below water
4.3-(2)	Toothpaste Investigation	• Is toothpaste a solid, a liquid, a mixture, or some other form of matter?	• Some materials have properties of both solids and liquids • Scientists test materials in many ways in order to compare them to what is known

Structures of Life Unit Design - Grade 3

The **Structures of Life Module** consists of four sequential investigations dealing with observable characteristics of organisms. Students observe, compare, categorize, and care for a selection of organisms, and in so doing they learn to identify properties of plants and animals and to sort and group organisms on the basis of observable properties. Students investigate structures of the organisms and learn how some of the structures function in growth and survival.

RI Statements of Enduring Knowledge - (Established Goals):
LS 1 All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species). LS 3 Groups of organisms show evidence of change over time (structures, behaviors, and biochemistry).

LS2 Matter cycles and energy flows through an ecosystem.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence*****High Emphasis Targets**

LS1 (3-4)-1 **Students demonstrate an understanding of classification of organisms by…** **1a** citing evidence to distinguish between living and non-living things. **1b** identifying, sorting and comparing based on similar and/or different external features. **1c** recording and analyzing observations/data about external features (e.g., within a grouping, which characteristics are the same and which are different). **1d** citing evidence (e.g., prior knowledge, data) to draw conclusions explaining why organisms are grouped/not grouped together (e.g., mammal, bird, fish).	***LS1 (K-4) – INQ+POC –1*** *Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.* Investigations 1-4 Science Stories, pp. 1-48 Investigation 3, Part 1, pp. 8-15 Investigation 4, Parts 1-2, pp. 8-19 Science Stories, pp. 17-18, 41-42 Investigation 4, Part 2, pp. 14-19 Investigation 4, Part 2, pp. 14-19
LS1 (3-4)-2 Students demonstrate understanding of structure and function-survival requirements by… **2a** observing that plants need water, air, food, light and <u>space</u> to grow <u>and reproduce</u>; observing that animals need water, air, food, and shelter/space to grow <u>and reproduce.</u>	***LS1 (K-4) SAE -2***** *Identify the basic needs of plants and animals in order to stay alive. (i.e., water, air, food, space).* Investigation 1, Part 2, pp. 18-27 Investigation 2, Part 2, pp. 14-17 Investigation 3, Part 2, pp. 16-19 Science Stories, pp. 4-5, 10-11, 18, 22-34
LS1 (3-4)-3 **Students demonstrate an understanding of reproduction by…** **3a** observing changes and recording data to scientifically draw and label the stages in the life cycle of a familiar plant and animal. **3b** sequencing the life cycle of a plant or animal when given a set of data/pictures. **3c** comparing the life cycles of 2 plants or 2 animals when given a set of pictures.	***LS1 (K-4) POC –3*** *Predict, sequence or compare the life stages of organisms – plants and animals (e.g., put images of life stages of an organism in order, predict the next stage in sequence, compare two organisms*) Investigation 2, Part 3, pp. 18-22 Investigation 2, Part 3, pp. 18-22 FOSS web, Activity: Life Cycles

	LS1 (3-4)-4 **Students demonstrate an understanding of structure and function survival requirements by…** **4a** identifying and explaining how the physical structure/characteristic of an organism allows it to survive and defend itself (e.g., of a characteristic – the coloring of a fiddler crab allows it to camouflage itself in the sand and grasses of its environment so that it will be protected from predators). **4b** analyzing the structures needed to for survival of populations of plants and animals in a particular habitat/environment (e.g., populations of desert plants and animals require structures that enable them to obtain/conserve/retain water **LS2 (3-4)-5** **Students demonstrate an understanding of energy flow in an ecosystem by** **…** **5a** identifying sources of energy for survival of organisms (i.e. light or food). **LS2 (3-4)-6** **Students demonstrate an understanding of food webs in an ecosystem by…** **6a** demonstrating in a food web that all animals' food begins with the sun. **6b** use information about organisms to design a habitat and explain how the habitat provides for the needs of the organisms that live there. **6c** explaining the way that plants and animals in that habitat depend on each other. **LS3 (3-4)-7Students demonstrate an understanding of equilibrium in an ecosystem by…** **7a** explaining what plants or animals might do if their environment changes (e.g., changing food supply or habitat due to fire, human impact, sudden weather related changes).	***LS1 (K-4) – FAF –4*** *Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire).* Investigation 3, Part 1, pp. 8-15 Investigation 4, Part 1-2, pp. 8-19 Science Stories, pp. 3, 17-18, 20-21, 22-34, 37-39 Science Stories, pp. 20-21, 22-34 ***LS2 (K-4) – SAE –5*** *Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy.* Science Stories, p. 43 ***LS2 (K-4) – SAE –6*** *Describe ways plants and animals depend on each other (e.g., shelter, nesting, food).* Science Stories, p. 43 Investigation 3, Part 2, pp. 16-19 ***LS3 (K-4) – SAE –7*** *Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).* Science Stories, pp. 35-36

Investigation – Time(45min periods)	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1	• Where do seeds come from? • Where are seeds found on plants?	• Seeds develop in the plant part called a fruit. • Different kinds of fruits have different kinds and number of seeds. • Seeds have a variety of **properties**.
3	• Can a seed grow without soil? • What effect does water have on seeds? • What would happen if we just watered the seeds instead of planting them in soil?	• Seeds undergo change in the presence of water. • A seed is an **organism**, a **living thing.**
1	• How much water does a seed soak up?	• A seed contains the embryo plant and stores food and water.
1	• What effect does water have on the seeds in the mini-sprouter? • How do the plants change over time? • How do seeds develop into plants?	• **Germination** is the onset of a seed's growth.
1	• How can you grow plants without soil • What conditions do plants need in order to grow?	• Plants need water, light, and nutrients to grow • Plants can grow in water if nutrients are added
1	• What is the sequence of the bean plant's life cycle?	• The **life cycle** is the process of a seed growing into a mature plant, which in turn produces seeds. • The fruit of the plant develops from the flower
3	• What are the structures of a crayfish? • How do the structures of the crayfish help the crayfish to survive?	• Crayfish have observable **structures** (legs, eyes, antennae, carapace, swimmerets, tail, pincers and mouth parts).

2	• What do we need to think about in order to build a suitable habitat for the crayfish in the classroom? • What do we need to know about the crayfish in order to keep them here in our classroom?	• Crayfish have particular requirements for life (water, food and shelter). • **Habitat** is where an animal lives.
1	• What do crayfish do when something happens to them?	• **Behavior** is what an animal does.
1	• Does each crayfish have its own house that it always goes to? • How can we keep track of crayfish movements over many days?	• Some animals claim a territory that they protect from other animals.
2	(NOTE: Since snails are hard to come by, Investigation 4 is optional.) • What structures do land snails have? • What does a snail need in its habitat?	• Land snails have a coiled shell, a large foot on which they glide, and a body with a variety of structures. • Land snails need water, food, air, and space.
1	• What functions do land snails structures serve? • How are the structures of the land snail and crayfish alike and how do they differ?	• An **organism's structures** have **functions** that help it survive in its **habitat**. • The **structures** found on different kinds of **organisms** show some similarities and some differences.

Water Unit Design - Grade 3

Water is the most important substance on Earth. Water dominates the surface of our planet, changes the face of the land, and defines life. These powerful, pervasive ideas are introduced here. The **Water Module** consists of four investigations in which students explore properties of water, changes in water, interactions between water and other earth materials, and how humans use water.

RI Statements of Enduring Knowledge - (Established Goals):

ESS1 - The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

PS1 - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size or amount of substance)

PS 2 Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

PS 3 The motion of an object is affected by forces.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence high emphasis assessment target**
ESS1 (K-2) –2 **Students demonstrate an understanding of processes and change over time within earth systems by …** **2a** conducting tests on how different soils retain water (e.g., how fast does the water drain through?). **ESS1 (3-4)–2** **Students demonstrate an understanding of processes and change over time within earth systems by …** **2a** conducting investigations and using observational data to describe how water moves rocks and soils. **ESS1 (3-4) –5** **Students demonstrate an understanding of processes and change over time within earth systems by …** 5b describing water as it changes into vapor in the air and reappears as a liquid when it's cooled. 5c explaining how this cycle of water relates to weather and the formation of clouds.	**ESS1 (K-4) INQ –2 **** *Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves)* Investigations 1-3 Science Stories, pp. 1-2, 4-9, 12-17 ***ESS1 (K-4) POC –5*** *Based on data collected from daily weather observations, describe weather changes or weather patterns.* Investigation 3, Parts 1-4, pp. 8-26 Science Stories, p. 13-16 FOSS Web, Activity: Evaporation

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence high emphasis assessment target**
Students demonstrate an understanding of physical changes by … **1c** observing and describing physical changes (e.g. freezing, thawing, torn piece of paper).	**PS1 (K-4) INQ –1 **** *Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility)* Investigation 2, Part 3, pp. 19-24 Investigation 3, Parts 1-4, pp. 8-26 Foss Web, Activity: Evaporation
PS1 (3-4) –2 **Students demonstrate an understanding of states of matter by …** **2a d**escribing properties of solids, liquids, and gases. **2b i**dentifying and comparing solids, liquids, and gases. **2c** making logical predictions about the changes in the state of matter when adding or taking away heat (e.g., ice melting, water boiling or freezing, condensation/evaporation).	***PS1 (K-4) POC –2*** *Make a prediction about what might happen to the state of common materials when heated or cooled or categorize materials as solid, liquid, or gas.* Investigation 1, Part 1, pp. 8-13 Investigation 2, Part 3, pp. 19-24 Science Stories, pp. 1-3, 8-9, 13 Investigation 1, Part 1, pp. 8-13 Investigation 2, Part 3, pp. 19-24 Science Stories, pp. 1-3, 8-9, 13 Investigation 2, Part 3, pp. 19-24 Investigation 3, Parts 1-4, pp. 8-26 FOSS Web, Activity: Evaporation

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence high emphasis assessment target**
PS2 (3-4)–6 **Students demonstrate an understanding of energy by…** **6a** Describing how heat moves from warm objects to cold objects until both objects are the same temperature. **6b** Showing that heat moves from one object to another causing temperature change (e.g., when land heats up it warms the air).	***PS2 (K-4) SAE+INQ –6*** *Experiment, observe, or predict how heat might move from one object to another.* Investigation 2, Parts 2-3, pp. 14-24 Science Stories, pp. 14-16 Investigation 1, Part 3, pp. 19-23 Investigation 4, Part 2, pp. 14-18

Investigation-Time (45 min. periods)	Focus-Essential Questions	Big Ideas
1.1 Looking at Water-(2)	• What happens when water gets spilled, splashed or dropped on something? • Does water do the same thing on all surfaces?	• Water has observable **properties**, including **transparency**, **shapelessness**, and movement or flow • Water beads up on some materials and is absorbed by other materials
1.2 Surface Tension-(2)	• What shape does water make on a flat surface? • Why does water forma dome on a flat surface? • How can you change the surface tension of plain water?	• **Surface tension** is the skinlike surface of water that pulls it together into the smallest possible volume • Drops of water form domes on pennies because of **surface tension** • **Surface tension** can be disrupted by the addition of some other substances
1.3 Water on a Slope-(2)	• What happens to beads of water when they are placed at the top of a slope? • How does changing the amount of water in a bead change the speed at which water flows downhill? • How does changing the slope change the speed at which water flows downhill?	• Water flows downhill • Larger amounts of water flow more quickly • Increasing the slope over which the water flows makes it flow more quickly
2.1 Build a Thermometer-(2)	• What happens to water when it is heated? • What happens to water when it is cooled?	• Water **expands** when heat is added • Water **contracts** when heat is taken away
2.2 Sinking and Floating Water-(2)	• Is hot water denser or less dense than room temperature water? • Is cold water denser or less dense than room temperature water?	• Warm water is less **dense** than room-temperature water • Cold water is more **dense** than room-temperature water. Cold water is **denser** than warm water • A material that floats in water is less **dense** than the water; a material that sinks is more **dense**

Investigation-Time (45 min. periods)	Focus-Essential Questions	Big Ideas
2.3 Water as Ice-(3)	• What happens to water when it freezes? • What happens to ice when it is heated? • How do the masses of equal volumes of ice and water compare?	• Water begins to **expand** when its temperature reaches 4 degrees C • Water is densest at 4 degrees C • Ice is less **dense** than liquid water • A solid has definite **volume** and **shape**; a liquid has only definite **volume**
3.1 Evaporation-(2)	• What happens when two paper towels are allowed to dry, one in a cup with a lid, and the other in an open cup?	• **Evaporation** is the process by which liquid water changes into water vapor, a gas
3.2 Evaporating Locations-(1)	• What effect does air temperature have on evaporation?	• **Temperature** effects the rate of evaporation
3.3 Surface Area-(2)	• What effect does surface area have on the rate of evaporation?	• The **surface area** of a **volume** of water affects the rate of **evaporation**
3.4 Condensation-(1)	• What happens when the surface area of an object or material is cooler than the air surrounding it?	• **Condensation** occurs when water vapor touches a cool surface and changes into a liquid • **Evaporation** and **condensation** contribute to the movement of water through the water cycle
3.5 Water Cycle Game-(2)	• What happens to a water molecule during the water cycle?	• The *water cycle* is the endless sequence of condensation and evaporation of water on Earth.

Investigation-Time (45 min. periods)	Focus-Essential Questions	Big Ideas
4.1 Water in Earth Materials-(2)	• What happens when you pour water through different earth materials?	• Some **earth materials**, like soils, **absorb** more water than other **earth materials** • Water flows more easily through some **earth materials** that through others
4.2 Waterwheels-(2)	• How does a waterwheel work? • What is the best design for a waterwheel that will efficiently lift objects?	• Flowing water can be used to do work • Waterwheels are a kind of a machine powered by flowing water
4.3 Water from Home-(2)	• What are some of the properties of water that affect its quality?	• Water contains different materials that affect its quality • **Evaporation** can be used to detect materials dissolved in water
4.4 Choosing Your Own Investigation-(3)	• Students ask their own questions and plan investigations or research to answer them	• Apply concepts developed concerning water, its properties and its uses

Ideas & Inventions Unit Design - Grade 3

The **Ideas and Inventions Module** consists of four sequential investigations promoting the inquiry process that promote student creativity and inventiveness. Each investigation provides valuable science content while introducing a conventional technique for revealing the unseen.

RI Statements of Enduring Knowledge - (Established Goals):
ESS2 – The earth is part of a solar system, made up of distinct parts that have temporal and spatial interrelationships.

PS1- All living and nonliving things are composed of matter having characteristics properties that distinguish one substance from another (independent of size or amount of substance).

PS2 – Energy is necessary for change to occur in matter. Energy can be stored, transferred, and transformed, but cannot be destroyed.

PS3 – The motion of an object is affected by forces.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** (Assessment Evidence) High Emphasis Targets**
ESS2 (3-4)-7 **Students demonstrate an understanding of temporal or positional relationships between or among the Earth, sun, and moon by …** 7a observing that the sun, moon, and stars appear to move slowly across the sky. 7b observing that the moon looks slightly different from day to day, but looks the same again in about 4 weeks.	Local Level Only (No further ESS Targets K-4)
ESS3 (3-4)-9 **Students demonstrate understanding of processes and change over time within the system of the universe (Scale, Distances, Star Formation, Theories, Instrumentation)** **by…** 9a recognizing that throughout history people have identified patterns of stars that we call constellations.	Science Stories, pp. 33-34, 37 **Science Stories, pp. 34-36**
PS1 (3-4)-1 **Students demonstrate an understanding of characteristic properties of matter by…**	**Science Stories, p. 37**

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** (Assessment Evidence) High Emphasis Targets**
1a identifying, comparing, and sorting objects by similar or different physical properties (e.g., size, shape, color, texture, smell, weight, temperature 1b citing evidence (e.g., prior knowledge, data) to support conclusions about why objects are grouped together.	**PS1 (K-4) – INQ–1**** Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility). **Investigation 2, Parts 1-2, pp. 8-19**
Students demonstrate an understanding of physical changes by… 1c observing and describing physical changes (e.g., freezing, thawing, torn piece of paper).	**Investigation 2, Parts 1-2, pp. 8-19**
PS2 (3-4)-5 **Students demonstrate an understanding of energy by…** 5a investigating observable effects of light using a variety of light sources (e.g., light travels in a straight line until it interacts with an object, blocked light rays produce shadows). 5b predicting, describing and investigating how light rays are reflected, refracted, or absorbed.	**Investigation 1, Parts 1-2, pp. 8-17** **Investigation 3, Parts 1-2, pp. 8-17** **PS2 (K-4) – SAE–5** Use observations of light in relation to other objects/substances to describe the properties of light (can be reflected, refracted, or absorbed). **Investigation 4, Parts 1-3, pp. 8-21** **Investigation 4, Parts 1-3, pp. 8-21** **Science Stories, pp. 28-32**
PS3 (3-4)-7 **Students demonstrate an understanding of motion by…** 7b describing change in position relative to other objects or background	**PS3 (K-4) – INQ + SAE–7**** Use data to predict how a change in force (greater/less might affect the position, direction of motion, or speed of an object (e.g., ramps and balls) **Investigation 3, Parts 1-2, pp. 8-17**

Investigation- **Time (45min. periods)**	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings Words in **bold** are important for science vocabulary development, and should be used for **word walls**.
1-(2)	Leaf Rubbings	Can you use rubbing techniques to learn about objects? What can leaf rubbing tell you about a leaf?	• **Texture** refers to the surface of a material. • **Pattern** is a design or arrangement of objects • Veins transport materials in a leaf • Leaf-venation **patterns** can be organized into three types: parallel, palmate, and pinnate
2-(3)	Carbon Printing	How can we look for patterns on finely textured objects like fingers? How are fingerprints alike and different? Can you solve a mystery using fingerprints?	• Carbon printing is a technique used to make fine textures visible • Fingerprints can be stored into three groups based on patterns: whorl, arch, and loop • No two people have the same fingerprints
3-(3)	Color Writing	How could we find out what pigments are used in different color markers? Can you solve a mystery using paper chromatography?	• Chromatography uses water to carry pigments from one place to another • Paper chromatography reveals pigments in watercolor inks • The process of water moving through paper is called wicking

Investigation- **Time (45min. periods)**	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings Words in **bold** are important for science vocabulary development, and should be used for **word walls**.
4-(4)	Reflecting	What can you see with mirrors that you cannot see without one? How can a mirror be used to find a line of symmetry? Can you make a rear view mirror for your desk? How can you see through a book using a mirror? How does a periscope work?	• **Light** travels in a straight line • Symmetry is an arrangement in which the parts on the opposite sides of a center line are the same • Mirror images are a result of light **reflected** from a surface • An image produced by something that **reflects**, such as a mirror, is always reversed right to left • Mirrors can be used to determine symmetry in objects • always reversed right to left • Mirrors can be used to determine symmetry

Earth Materials Unit Design - Grade 4

The **Earth Materials Module** consists of four sequential investigations dealing with observable characteristics of solid materials from the earth—rocks and minerals. The focus is on taking materials apart to find what they are made of and putting materials together to better understand their properties. The module introduces fundamental concepts in earth science

RI Statements of Enduring Knowledge - (Established Goals):

ESS 1 - The Earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

PS1 - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size or amount of substance)

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence *****High Emphasis Targets**
ESS1 (3 – 4) -1 Students demonstrate an understanding of earth materials by… **1a** describing, comparing, and sorting rocks, soils, *and minerals* by similar or different physical properties (e.g., size, shape, color, texture, smell, weight, *temperature, hardness, composition*). **1b** recording *and analyzing* observations/data about physical properties (e.g., *within a grouping,* some characteristics are the same and other are different. **1c** *citing evidence (e.g., prior knowledge, data) to support why* rocks, soils, *or minerals* are *classified/not classified* together.	*****ESS1 (K-4) INQ–1** *Given certain earth materials (soils, rocks or minerals) use physical properties to sort, classify, and describe them.* Investigation 1, Parts 1-3, pp. 8-29 Investigation 2, Parts 1-2, pp. 8-21 Investigation 4, Part 1, pp. 8-13 FOSS Web, Activity: Rock Database Investigations 1-4 Science Stories, pp. 12-15, 30-37
PS1 (3-4)–1 Students demonstrate an understanding of characteristic properties of matter by … **1a** identifying, comparing, and sorting objects by similar or different physical properties (e.g., size, shape, color, texture, smell, weight, temperature, flexibility). **1b** recording and analyzing observations/data about physical properties (e.g., within a grouping, some characteristics are the same and others are different. **1c** citing evidence (e.g., prior knowledge, data) to support conclusions about why objects are grouped/not grouped together.	**PS1 (K-4) INQ –1** *Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility)* Investigation 1, Parts 1-2, pp. 8-23 Investigation 2, Parts 1-2, pp. 8-21

Words in **bold** are important for science vocabulary development, and should be used for word walls.

Investigation-Time (45min.periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1-(2)	Investigating Mock Rocks	• What are some of the properties we can use to describe individual rocks?	• **Rocks** have many **properties**, including **shape, size, color, and texture.** • **Geologists** use **rock properties** to help identify different **rocks**. • Some dimensions of **rocks** can be measured and compared.
1.2-(2)	Taking Rocks Apart	• How can we determine the ingredients of a rock? • How can we separate the ingredients of a rock?	• Rocks are made of ingredients called **minerals**; **minerals** are made of only one ingredient. • Some ingredients can be identified by breaking rocks apart. • Water can be used to separate ingredients: some break into smaller pieces, and some dissolve.
1.3-(2)	Observing Crystals	• What are the ingredients in mock rocks? What evidence do you have to support your conclusions?	• **Rocks** are made of **minerals**. • **Evaporation** is a way to separate liquid and solid ingredients. • **Mineral crystals** have identifiable shapes.
2.1-(2)	Observing Minerals	• What properties can we use to identify minerals?	• A **mineral** is a basic earth material that cannot be physically broken down any further. • **Minerals** are the ingredients that make up rocks. • It is usually necessary to know several **properties** of a **mineral** in order to identify it.
2.2-(1)	Testing for Hardness	• What properties can we use to identify minerals? • How can your fingernail, a penny, and a paper clip help to determine hardness?	• **Hardness**, a **mineral property**, is the resistance of a mineral to being scratched. • **Minerals** can be seriated by **hardness**. • When comparing the **hardness** of any two objects, the harder one will scratch the softer one.
3.1-(1)	Detecting Calcite	• How can we tell if one of the ingredients in a rock is the mineral calcite?	• **Rocks** are made of **minerals**. • Calcite is one of the most common minerals on Earth. • Putting acid on a rock is a tool **geologists** use to identify calcite.
3.2-(1)	Looking for More Evidence	• Is there another test that we can do to know for sure which rocks contain calcite?	• Sometimes more than one test is needed to provide conclusive evidence. • **Evaporation** is a technique used to separate liquid from solid parts of a **mixture** or **solution**. • **Crystal** patterns can help us identify certain **minerals**. • **Limestone** and **marble** are two rocks that contain **calcite**.

Investigation-Time (45min.periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
4.1-(2)	Identifying Minerals in Granite	• What are the mineral ingredients in granite?	• **Rocks** are made of ingredients called **minerals**. • **Rocks** and **minerals** have identifiable **characteristics**. • The **minerals** that make up a **rock** can be identified by observing certain **characteristics**.
4.2-(ongoing)	Choose investigation	(Dependent on investigation)	

Matter & Energy Unit Design - Grade 4

The Matter and Energy Module consists of four sequential investigations. Students experience a variety of forms of matter and energy. They investigate the properties of light, observe the conversion of energy from one form to another, and explore properties of the three common states of matter (solid, liquid, and gas). Students use metric tools to measure the properties of matter—mass, volume, and temperature—and observe that starting substances can change into new substances as a result of a chemical reaction.

RI Statements of Enduring Knowledge - (Established Goals):

PS1- All living and nonliving things are composed of matter having characteristics properties that distinguish one substance from another (independent of size or amount of substance).

PS2 – Energy is necessary for change to occur in matter. Energy can be stored, transferred, and transformed, but cannot be destroyed.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence-High Priority**
PS1 (3-4)-1 **Students demonstrate an understanding of characteristic properties of matter by…** **1a** identifying, comparing, and sorting objects by similar or different physical properties (e.g., size, shape, color, texture, smell, weight, temperature, flexibility). **1b** citing evidence (e.g., prior knowledge, data) to support conclusions about why objects are grouped together. **Students demonstrate an understanding of physical changes by…** **1c** observing and describing physical changes (e.g., freezing, thawing, torn piece of paper). **PS1 (3-4)-2** **Students demonstrate an understanding of states of matter by…** **2a** describing properties of solids, liquids, and	**PS1 (K-4) – INQ–1**** *Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility).* **Matter and Energy** Investigation 3, Part 1, pp. 129-138 Science Resources, pp. 2-13 **Matter and Energy** Investigation 4, Part 2, pp. 181-192 **PS1 (K-4) – POC–2** *Make a prediction about what might happen to the state of common materials when heated or*

Related Rhode Island GSE's (Understandings)	RI Assessment Targets Assessment Evidence-High Priority**
gases. **2b** identifying and comparing solids, liquids, and gases. **2c** making logical predictions about the changes in the state of matter when adding heat (e.g., ice melting, water boiling or freezing, condensation/evaporation). **PS1 (3-4)-3** **Students demonstrate an understanding of conservation of matter by…** **3a** measuring the weight of objects to prove that all matter has weight. **3b** using measures of weight to prove that the whole equals the sum of its parts. **3c** showing that the weight of an object remains the same despite a change in its shape. **PS2 (3-4)-5** **Students demonstrate an understanding of energy by…** **5a** investigating observable effects of light using a variety of light sources (e.g., light travels in a straight line until it interacts with an object, blocked light rays produce shadows). **5b** predicting, describing and investigating how light rays are reflected, refracted, or absorbed. **PS2 (3-4)-6** **Students demonstrate an understanding of energy by…** **6b** showing that heat moves from one object to another causing temperature change (e.g., when land heats	*cooled or categorize materials as solid, liquid, or gas.* **Matter and Energy** Investigation 3, Part 1, pp. 129-138 Science Resources, pp. 2-13 **Matter and Energy** Investigation 4, Part 2, pp. 181-192 Science Resources, pp. 54-56 **PS1 (K-4) – SAE–3** *Use measures of weight (data) to demonstrate that the whole equals the sum of its parts.* **Matter and Energy** Investigation 3, Part 2, pp. 139-150 **Matter and Energy** Science Resources, p. 70 **PS2 (K-4) – SAE–5** *Use observations of light in relation to other objects/substances to describe the properties of light (can be reflected, refracted, or absorbed).* **Matter and Energy** Investigation 2, Parts 1-2, pp. 93-114 Science Resources, pp. 24-36 **PS2 (K-4) – SAE + INQ–6** *Experiment, observe, or predict how heat might move from one object to another*. **Matter and Energy**

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence-High Priority**
up it warms the air).	Investigation 4, Part 1, pp. 174-180

Magnetism and Electricity Unit Design - Grade 4

The **Magnetism and Electricity Module** consists of five sequential investigations, each designed to introduce or reinforce concepts in physical science, particular with the forces associated with magnetism & electricity. Strong math alignment with NECAP also is fostered..

RI Statements of Enduring Knowledge - (Established Goals):
PS1 -All living and nonliving things are composed of matter having characteristics properties that distinguish one substance from another (independent of size or amount of substance).
PS 2 Energy is necessary for change to occur in matter. Energy can be stored, transferred, and transformed, but cannot be destroyed.

PS 3 The motion of an object is affected by forces.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence
PS1 (3-4)-1 **Students demonstrate an understanding of characteristic properties of matter by…** **1a** identifying, comparing, and sorting objects by similar or different physical properties (e.g., size, shape, color, texture, smell, weight, temperature, flexibility). **1b** citing evidence (e.g., prior knowledge, data) to support conclusions about why objects are grouped together. **PS2 (3-4)–4** **Students demonstrate an understanding of energy by…** **4d** building a complete circuit; drawing and labeling diagrams of electrical circuits; and explaining what makes a complete circuit. **4e** using experimental data to classify a variety of materials as conductors or insulators.	***PS1 (K-4) – INQ–1*** *Collect and organize data about physical properties in order to classify objects or draw conclusions about objects and their characteristic properties (e.g., temperature, color, size, shape, weight, texture, flexibility).* Investigation 1, Part 1, pp. 8-17 Investigation 2, Part 3, pp. 20-25 ***PS2 (K-4) SAE –4*** *Given a specific example or illustration (e.g., simple closed circuit, rubbing hands together), predict the observable effects of energy (i.e., light bulb lights, a bell rings, hands warm up (e.g., a test item might ask, "what will happen when…?)* Investigation 2, Parts 1-2, pp. 8-19 Investigation 3, Parts 1-2, pp. 10-21

PS3 (K-2)–8 **Students demonstrate an understanding of (magnetic) force by…** **8a** observing and sorting objects that are and are not attracted to magnets. **PS3 (3-4)-8** **Students demonstrate an understanding of (magnetic) force by…** **8a** using prior knowledge and investigating to predict whether or not an object will be attracted to a magnet. **8b** describing what happens when like and opposite poles of a magnet are placed near each other. **8c** exploring relative strength of magnets (e.g., size of magnets, number of magnets, properties of materials).	***PS3 (K-4) INQ+SAE-8*** *Use observations of magnets in relation to other objects to describe the properties of magnetism (i.e., attract or repel certain objects or has no effect)* Investigation 1, Part 1, pp. 8-17 Science Stories, pp. 6-8

Investigation-Time (45 min periods)	**Investigation**	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1-(2)	Investigating Magnets and Materials	• What kind of materials do magnets stick to? • What happens when you bring two or more magnets together?	• Only iron sticks to a magnet. • Two magnets attract or repel when they interact. • The magnetic force causes magnetic interactions. • A force is a push or a pull.
1.2-(2)	Investigating More Magnetic Properties	• How do magnets interact with other objects? • Does an iron object have to touch a magnet? • Does magnetic force go through all materials?	• Magnetism can be induced only in iron or steel (or a few other metals.) • The magnetic force acts through space and most materials. • The magnetic force of attraction between two magnets decreases with distance.
1.3-(2)	Breaking the Force	• How can we measure the force of attraction between two magnets?	• The greater the distance between two magnets, the less the magnetic force. • Magnetic fields act right through cardboard.
1.4-(2)	Detecting the Force of Magnetism	• Can you figure out where two magnets are taped in a box without looking?	• Compasses, iron filings, and iron objects can detect a magnetic field.

Investigation-Time (45 min periods)	Investigation	Focus Questions (Essential Questions)	Big Ideas (Understandings)
2-(4)	Making Connections		• A closed circuit is a pathway that allows electricity to flow; an open circuit does not. • Conductors are materials that allow the flow of electricity; insulators are materials that do not allow the flow of electricity. • A switch is a device that opens and closes a circuit.
2.1-(2)	Lighting a Bulb	• How can you get electricity from a source to a receiver? • Where do connections need to be made? • How does electricity flow through a circuit?	• A D cell is a source of electric energy. • A bulb is an energy receiver that produces light. • A circuit is a pathway through which electric current flows.
2.2-(2)	Making a Motor Run	• How can you get electricity from a source to a receiver? • How is the motor circuit like the light bulb circuit? How is it different? • What does a switch do in a circuit?	• A motor is an energy receiver that produces motion. • A switch is a device that opens and closes a circuit. • A schematic diagram is a representation of a circuit that is used for recording and communicating with others.
2.3-(1)	Finding Conductors and Insulators	• Can any of the test objects complete a circuit? • How much of the classroom environment is made of conductors?	• Materials that allow the flow of electricity are conductors. • Materials that do not allow the flow of electricity are insulators. • All metals are conductors.
2.4-(1)	Investigating Mystery Circuits	• Can you use your knowledge of electricity to discover which paper fasteners are connected by wires?	• Students can demonstrate their knowledge of circuits by identifying hidden connections on a mystery board.
3	Advanced Connections		• An electrical circuit is a pathway along which electricity flows. • A series circuit has only one pathway while a parallel circuit has two or more pathways.
3.1-(2)	Building Series Circuits	• Can you get two bulbs to light at the same time? • Can you make two lights bright in a series circuit?	• A circuit with only one pathway for current flow is a series circuit. • Components in a series circuit “share” the electric energy. • Cells in series must be oriented in the same direction in order to work.
3.2-(2)	Building Parallel Circuits	• Can you light two bulbs brightly with just one battery? • How many different ways can you wire a parallel circuit?	• A parallel circuit splits into two or more pathways before coming back together at the battery. • Components in a parallel circuit each have a direct pathway to the energy source.
3.3-(2)	Solving the String-of- Lights Problem	• Which design is better for manufacturing long strings of tree lights – series or parallel?	• A parallel circuit will allow the rest of the bulbs to remain lighted when one bulb burns out.

Investigation-Time (45 min periods)	Investigation	Focus Questions (Essential Questions)	Big Ideas (Understandings)
4	Current Attractions		• Electromagnetism is magnetism created by current flowing through a conductor. • Electromagnetism can be turned on and off..
4.1-(1)	Building an Electromagnet	• Can you make an electromagnet that turns on and off?	• A magnet can be made by winding an insulated wire around an iron core and running current through the wire. • The magnetism produced by an electromagnet can be turned on and off.
4.2-(2)	Changing Number of Winds	• How does the number of winds of wire around a core affect the strength of the magnetism?	• The greater the number of winds around the iron core, the stronger the magnetism produced. • A graph can be used to make predictions.
4.3-(1)	Investigations More Electromagnets	• How can the strength of an electromagnet be changed?	• There are many ways to change the strength of an electromagnet, including tighter coils, number of D-cells, different wire gauge. • Wire used to make an electromagnet must be insulated. • All wire coils must be wound in the same direction.
5-(2-3)	Click It		• Science is knowledge of the natural world; technology is using scientific knowledge to modify the world to solve human problems. • Electromagnetism is magnetism created by current flowing through a conductor.
5.1-(2)	Reinventing the Telegraph	• Can you use your knowledge of electricity and electromagnetism to reinvent the telegraph?	• People learn about the natural world through scientific practices and use that knowledge to meet human needs such as communication. • A code is a symbolic system for communication.
5.2-(1)	Sending Messages Long-Distance	• Can you connect two telegraph systems to send messages back and forth to another group?	• Connecting two telegraphs for two-way communication requires two complete circuits.

Environments Unit Design - Grade 4

All living things depend on the conditions in their environment. The study of the relationships between one organism and its environment builds knowledge of all organisms. With this knowledge comes an awareness of limits. Changes in an environment can be hard on organisms. Such knowledge is important because humans can change environments. To do so without awareness of possible consequences can lead to disasters. The **Environments Module** consists of six investigations that introduce students to these basic concepts in environmental biology.

RI Statements of Enduring Knowledge - (Established Goals):

LS 1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).

LS2 - Matter cycles and energy flows through an ecosystem**.**

LS3 - Groups of organisms show evidence of change over time (structures, behaviors, and biochemistry).

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** High emphasis targets**
LS1 (5-6) – 1 Students demonstrate understanding of biodiversity by… **1a** recognizing that organisms have different features and <u>behaviors for meeting their needs to survive</u> (e.g., fish have gills for respiration, mammals have lungs, bears hibernate). **LS1 (5-6)-2** **Students demonstrate an understanding of structure and function survival requirements by…** **2a** describing structures or behaviors that help organisms survive in their environment (e.g., defense, obtaining nutrients, reproduction, and eliminating waste).	***LS1 (5-8) – INQ + SAE –1***** *Using data and observations about the biodiversity of an ecosystem make predictions or draw conclusions about how the diversity contributes to the stability of the ecosystem.* Science Stories, pp. 1-8, 11-17, 20, 22, 32, 53-54 ***LS1 (5-8) – SAE + FAF –2***** *Describe or compare how different organisms have mechanisms that work in a coordinated way to obtain energy, grow, move, respond, provide defense, enable reproduction, or maintain internal balance (e.g., cells, tissues, organs and systems).* Science Stories, pp. 1-8, 11-17, 20, 22, 32, 53-54

Related Rhode Island GSE's (Understandings)	RI Assessment Targets High emphasis targets**
LS2 (5-6) –5 **Students demonstrate an understanding of equilibrium in an ecosystem by …** 5a **identifying and defining an ecosystem and the variety of relationships within it (e.g., predator/prey, consumer/ producer/decomposer, host/parasite, catastrophic events).**	***LS2 (5-8) INQ+SAE -5*** *Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem.* Science Stories, pp. 38-41, 43-45
LS2 (3-4)–6 **Students demonstrate an understanding of food webs in an ecosystem by …** **6b** using information about organisms to design a habitat and explain how the habitat provides for the needs of the organisms that live there **6c** explaining the way that plants and animals in that habitat depend on each other.	**LS2 (K-4) SAE –6**** *Describe ways plants and animals depend on each other (e.g., shelter, nesting, food).* Science Stories, pp. 38-41
LS2 (5-6)-7 Students demonstrate an understanding of recycling in an ecosystem by … **7b** completing a basic food web for a given ecosystem.	**LS2 (5-8) SAE-7** *Given an ecosystem, trace how matter cycles among and between organisms and the physical environment (includes water, oxygen, food web, decomposition, recycling but **not** carbon cycle or nitrogen cycle).* Science Stories, pp. 38-41
LS3 (3-4) –7 **Students demonstrate an understanding of equilibrium in an ecosystem by …** **7a** explaining what plants or animals might do if their environment changes (e.g., changing food supply or habitat due to fire, human impact, sudden weather-related changes). **7b** explaining how the balance of the ecosystem can be disturbed (e.g., how does overpopulation of a species affect the rest of the ecosystem).	***LS3 (K-4) SAE –7*** *Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).* Investigation 3, parts 1, 2, and 3

Related Rhode Island GSE's (Understandings)	RI Assessment Targets High emphasis targets**
LS3 (5-6) -9 **Students demonstrate an understanding of Natural Selection/evolution by …** 9a **explaining how a population's or species' traits affect their ability to survive over time.** **9b** researching or reporting on possible causes for the extinction of an animal or plant.	***LS3 (5-8) POC-9*** *Cite examples supporting the concept that certain traits of organisms may provide a survival advantage in a specific environment and therefore, an increased likelihood to produce offspring.* Science Stories, pp. 1-8, 11-17, 20, 22, 32, 53-54

Investigation-Time (45min. periods)	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
1.1 Setting Up Terrariums -(2)	What environmental factors affect the growth of seeds?	• *Environmental factors,* such as amount of water, air, space, and proper temperature, affect organisms. Organisms also affect their environment.
1.2 Recording Changes-(ongoing)	How does the environment in the terrarium change over time?	• *Environmental factors* such as amount of water, air, space, and proper temperature affect organisms. Organisms also affect their environment. • Plants and animals are living and have *basic needs*. Both plants and animals need water, air, space, and food; plants also need light.
2.1 Making Animal Runways-(3)	What type of environment do isopods and beetles prefer?	***Purpose*: to record observations of beetles and isopods.** ***What to look for:*** • *Observations are recorded, including similarities and differences.* • Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated. ***Purpose*: to provide a procedure for constructing a runway.** ***What to look for:*** • *Students suggest setting up an environment in the runway that is uniform (variables controlled) except for the amount of water (the experimental variable).)* • *The amount of water varies from wet at one end to dry at the other. • Bugs and beetles are able to roam freely among the wet to dry conditions (no barriers set up).)* • *Time is specified. For example, make observations every 10 minutes for an hour.* • *Students suggest a way to organize the data they will collect.*
2.2 Responding To Moisture -(1)	How much moisture do isopods and beetles prefer?	• Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated. • Every organism has a *range* of *tolerance* for environmental factors which includes an optimum condition. (A preferred environment is a set of environmental conditions that, an organism appears to choose over other conditions.)

Investigation-Time (45min. periods)	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
2.3 Responding To Light-(1)	How do isopods and beetles respond to different amounts of light?	• Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated. • Every organism has a *range* of *tolerance* for environmental factors which includes an optimum condition. (A preferred environment is a set of environmental conditions that an organism appears to choose over other conditions.)
2.4 Designing An Animal Investigation-(2)	How do we design an investigation that involves animals?	• Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated. • *Environmental factors,* such as amount of water, air, space, and proper temperature, affect organisms. Organisms also affect their environment. • Every organism has a *range* of *tolerance* form, environmental factors which include an optimum condition.
3.1 Setting Up The Experiment-(2)	What are the optimal water conditions for each of four plants: corn, wheat, barley and peas?	• Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated.
3.2 Observing Plants At 5 And 8 Days-(8/ongoing)	What changes in the plants have taken place over time?	• Students appropriately organize observations/data in a variety of forms: *charts*, *graphs*, and diagrams; or evaluate those of others.
3.3 Observing Plants At 11 Or More Days-(ongoing)	What changes in the plants take place over time?	• Students appropriately organize observations/data in a variety of forms: *charts*, *graphs*, and diagrams; or evaluate those of others. • Every organism has a *range* of *tolerance* for environmental factors which includes an optimum condition. (A preferred environment is a set of environmental conditions that an organism appears to choose over other conditions.)

Investigation-Time (45min. periods)	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
4.1 Goldfish Aquariums-(2)	What are the environmental factors to consider when setting up a goldfish aquarium?	• *Environmental factors,* such as amount of water, air, space, and proper temperature, affect organisms. Organisms also affect their environment. • Plants and animals are living and have *basic needs*. Both plants and animals need water, air, space, and food; plants also need light.
4.2 Acid In Water-(1)	Do living organisms affect the quality of aquatic environments?	• *Environmental factors,* such as amount of water, air, space, and proper temperature, affect organisms. Organisms also affect their environment. • Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated.
4.3 New Organisms-(ongoing)	What other organisms might live in the same environment as the goldfish?	• *Environmental factors,* such as amount of water, air, space, and proper temperature, affect organisms. Organisms also affect their environment.
5.1 Setting Up The Experiment-(2)	How can we find out if salinity has an effect on brine shrimp hatching? What is the range of salinity in which brine shrimp eggs can hatch?	• Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated.
5.2 Determining The Range Of Tolerance-(ongoing)	What is the optimum environment for hatching brine shrimp eggs?	• Every organism has a *range* of *tolerance* for environmental factors which includes an optimum condition. (A preferred environment is a set of environmental conditions that an organism appears to choose over other conditions.) • *Environmental factors,* such as amount of water, air, space, and proper temperature, affect organisms. Organisms also affect their environment.

5.3 Determining Viability-(1)	Will brine shrimp eggs hatch when removed from salt environments outside their range of tolerance into environments within their range of tolerance?	• *Environmental factors,* such as amount of water, air, space, and proper temperature, affect organisms. Organisms also affect their environment. • Every organism has a *range* of *tolerance* for environmental factors which includes an optimum condition. (A preferred environment is a set of environmental conditions that an organism appears to choose over other, conditions.)
Investigation-Time (45min. periods)	**Focus Questions** (Essential Questions)	**Big Ideas** (Understandings)
6.1 Setting Up The Experiment-(2)	What is the salt tolerance of several common farm crops?	• Students can identify *variables* and/or write or evaluate appropriate *procedures* given a question that can be investigated.
6.2 Observing Plants-(ongoing)	What changes in the plants can be observed over time?	• Every organism has a *range* of *tolerance* for environmental factors which includes an optimum condition. (A preferred environment is a set of environmental conditions that an organism appears to choose over other conditions.)

Landforms Unit Design - Grade 5

The **Landforms Module** consists of five investigations that introduce students to these fundamental concepts in earth science: change takes place when things interact; all things change over time; patterns of interaction and change are useful in explaining landforms. Students also learn about some of the tools and techniques used by cartographers and use them to depict landforms.

RI Statements of Enduring Knowledge - (Established Goals):
ESS 1 The Earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence
ESS1 (5-6)–1 **Students demonstrate an understanding of processes and change over time within earth systems by …** **1a** identifying and describing the layers of the earth.	***ESS1 (5-8) INQ+ POC –1*** *Use geological evidence provided to support the idea that the Earth's crust/lithosphere is composed of plates that move.* Science Stories, pp. 22-23
ESS1 (5-6)–2 Students demonstrate an understanding of processes and change over time within earth systems by … **2a** diagramming, labeling and explaining the processes of the water cycle including evaporation, precipitation, and run-off, condensation, transpiration, and groundwater.	***ESS1 (5-8) SAE–2*** *Explain the processes that cause the cycling of water into and out of the atmosphere and their connections to our planet's weather patterns.* Investigation 2.1, 2.2
ESS1 (7-8)–3 Students demonstrate an understanding of processes and change over time within earth systems by … **3a** evaluating slow processes (e.g. weathering, erosion, mountain building, sea floor spreading) to determine how the earth has changed and will continue to change over time. **3b** evaluating fast processes (e.g. erosion, volcanoes and earthquakes) to determine how the earth has changed and will continue to change over time. **3c** investigating the effect of flowing water on landforms (e.g. stream table, local environment).	***ESS1 (5-8) POC –3*** *Explain how earth events (abruptly and over time) can bring about changes in Earth's surface: landforms, ocean floor, rock features, or climate.* Investigation 2.1, 2.2 Investigation 2.1, 2.2 Investigation 5.1-5.3

ESS1 (3-4) –4 Students demonstrate an understanding of processes and change over time within earth systems by …	***ESS1 (K-4) INQ+SAE –4*** *Explain how wind, water, or ice shape and reshape the earth*
4a investigating local landforms and how wind, water, or ice have shaped and reshaped them (e.g. severe weather).	Investigation 3.1-3.3
4b using or building models to simulate the effects of how wind and water shape and reshape the land (e.g., erosion, sedimentation, deposition, glaciation).	Investigation 3.1-3.3
4c identifying sudden and gradual changes that affect the Earth (e.g. sudden change = flood; gradual change = erosion caused by oceans).	Investigation 3.1-3.3

Words in **bold** are important for science vocabulary development, and should be used for word walls.

Investigation-Time	Investigation	Focus Questions (Essential Questions)	Big Ideas (Understandings)
1-(2)	Schoolyard Models	• How do models and maps help us show representations of the earth?	• **Models** represent objects that are very large or processes that occur over a long period of time. • Models and maps are ways of representing **landforms** and human **structures**. • Maps can be made from **models**
2-(2)	Stream Tables	• How does water shape landforms? • What are erosion and deposition? • What are some landforms that result from running water?	• Water is an important agent in shaping **landforms**\ • The wearing away of earth is **erosion**; the settling of eroded material is **deposition**. • **Landforms** that result from running water include **canyons**, **deltas**, and **alluvial fans**.
3-(2)	Go With the Flow	• How does the flow of the land affect erosion and deposition? • What happens to the rate of erosion and deposition during flooding? • How do humans affect the processes of erosion and deposition?	• The slope of the land over which a river flows affects the processes of **erosion** and **deposition**. • During flooding, the rate of erosion and **deposition** increases. • Humans affect the processes of **erosion** and **deposition**.

4-(3)	Build a Mountain	• What are topographical maps? • How do topographic maps show elevation? • How do topographic maps represent landforms?	• **Topographic** maps are two- dimensional representations of three-dimensional surfaces. • **Topographic** maps show **contour lines**, which represent points of equal **elevation**. • **Topographic** maps use symbols and color to represent **landforms**.
5-(3)	Bird's-Eye View	• What are cartographers? • How are landform maps generated?	• **Cartographers** use aerial photographs as one tool in constructing **topographic** maps. • **Landform** maps can be generated from aerial photographs.

Mixtures & Solutions Unit Design - Grades 5

Chemistry is the study of the structure of matter and the changes or transformations that take place in it. Learning about the makeup of substances gives us knowledge about how things go together and how they can be taken apart. Learning about changes in substances is important for several reasons: changes can be controlled to produce new materials; changes can be used to give off energy to run machines. The **Mixtures and Solutions Module** has four investigations that introduce students to these fundamental ideas in chemistry.

RI Statements of Enduring Knowledge - (Established Goals):

PS1- All living and nonliving things are composed of matter having characteristics properties that distinguish one substance from another (independent of size or amount of substance).

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** Assessment Evidence-High Priority**
PS1 (5-6)-2 **Students demonstrate an understanding of characteristic properties of matter by…** 2a recognizing that different substances have properties which allow them to be identified regardless of the size of the sample. 2b classifying and comparing substances using characteristic properties (e.g., solid, liquid, gas).	**PS1 (5-8) – INQ + POC–2** *Given data about the characteristics of matter (e.g., melting and boiling points, density, solubility) identify, compare, or classify different substances.*** **Mixtures and Solutions** Investigation 2, Part 4, pp. 26-28
PS1 (5-6)-3 **Students demonstrate an understanding of conservation of matter by…** 3a explaining that regardless of how parts of an object are arranged, the mass of the whole is always the same as the sum of the masses of its parts.	**PS1 (5-8) – INQ + SAE–3** *Collect data or use data provided to infer or predict that the total amount of mass in a closed system stays the same, regardless of how substances interact (conservation of matter).* **Mixtures and Solutions** Investigation 1, Part 2, pp. 16-20
PS1 (5-6)-5 **Students demonstrate an understanding of the structure of matter by…** 5a distinguishing between solutions, mixtures, and "pure" substances, i.e., compounds and elements	**PS1 (5-8) –MAS–5** *Given graphic or written information, classify matter as atom/molecule or element/compound (Not the structure of an atom).* **Mixtures and Solutions** Investigation 1, Parts 1-2, pp. 8-20 Investigation 4, Parts 1-3, pp. 8-24 Science Stories, pp. 1-6, 11-12, 28, 32-42

Investigation-Time (45min. periods)	Investigation	Focus Questions (Essential Questions)	Big Ideas (Understandings)
1-(4)	**Separating Mixtures**	What is a Mixture? What is a Solution? How does evaporation affect liquids and solids in a solution?	▪ A **mixture** combines solids and liquids to make mixtures and solutions. ▪ A **solution** forms when a material dissolves in a liquid (**solvent**) and cannot be retrieved with a filter. ▪ **Evaporation** can separate a liquid from a solid in a solution. ▪ The solid material separated by **evaporation** from a solution forms distinctive patterns.
2-(3)	**Reaching Saturation**	What is solubility? What is saturation? How do we measure a concentrated solution?	▪ **Solubility** is the property that substances have of dissolving in solvents. Solubility is different for different materials and can change with temperature and different solvents. ▪ A solution is **saturated** when as much solid material as possible has dissolved in the liquid. ▪ When equal volumes of two solutions made from the same ingredients are compared, the heavier one is the more **concentrated** solution.
3-(3)	**Concentration**	What is a concentration? How does the amount of material dissolved in a solution affect concentration? How do we dilute a solution?	▪ **Concentration** expresses a relationship between the amount of dissolved material and the **volume** of solvent. ▪ The more material **dissolved** in a liquid, the more concentrated the solution.
4-(2)	**Fizz Quiz**	What is a chemical reaction? What kinds of changes occur in chemical reactions?	▪ When a change results from mixing two or more materials, that change is a **chemical reaction**. A reaction results in new materials. ▪ Formation of a gas is one change that occurs in some reactions. ▪ Formation of a **precipitate** occurs in some chemical reactions. ▪ Not all chemicals react when they are mixed.

Formative Assessment in the Elementary School

Science Notebooks, Claims & Evidence, and RAISE

In light of the newly released and state adopted National Common Core Standards for Literacy in Science, student use of science notebooks is critical every day, K-12 based on numerous research studies. Also, their use is in support of one of the North Smithfield District's overall goals to support the improvement of students' achievement with respect to their writing abilities. Students must develop effective, in depth, and extended writing responses on demand, including Rhode Island's NECAP testing in science as well as other content areas.

The district also has introduced and adopted the **RAISE** model for effective writing in numerous workshops. The implementation of this model, when used with the East Bay Educational Collaborative's **Scientist's Notebook** pedagogical workshop model of instruction for inquiry based science, will translate ultimately to students developing their abilities to write highly effective scientific conclusions for all inquiry experiences. It will also develop their abilities to communicate clearly their scientific conceptual understandings.

The RAISE model is in complete alignment with the use of Science Notebooks/journals and can be used with them to help students develop, practice, and refine their science understanding, while also enhancing reading, writing, mathematics and communications, to meet these new standards. As teachers involve students in inquiry-based science investigations, the need to communicate science learning in new ways has become evident. If students are encouraged to communicate their understanding of concepts through science notebook writings, these notebooks can be an effective strategy to help students learn science. Research has shown that science notebook writing may also be a way for students to strengthen their language skills as they develop an understanding of the world around them. Science notebooks allow teachers to formatively assess students' understanding and provide the timely feedback students need for improving their performance.

Science notebooks contain a record of information about the students' classroom inquiry experiences and are encouraged to use them as scientists would, before, during, and after all investigations. They are a place where students formulate and record their questions, make predictions, record data, procedures, and results, compose reflections, and communicate findings. Most importantly, notebooks provide a place for students to record new concepts they have learned.

Excellent sources of information about the use of notebooks are the East Bay Educational Collaborative's website at www.ebecri.org and "Using Science Notebooks in the Elementary Classroom" by Dr, Michael Klentschy NSTA Press whose research (among many others) supports this work..

A Comparison of RAISE* and how it fits with the Scientist's Notebook Model of Instruction* when students write their *scientific conclusion and Constructed Responses for NECAP-RI type assessments;* *RAISE details are courtesy of Clare Arnold, North Smithfield District Curriculum Director Scientist's Notebook Model details are provided by the East Bay Educational Collaborative

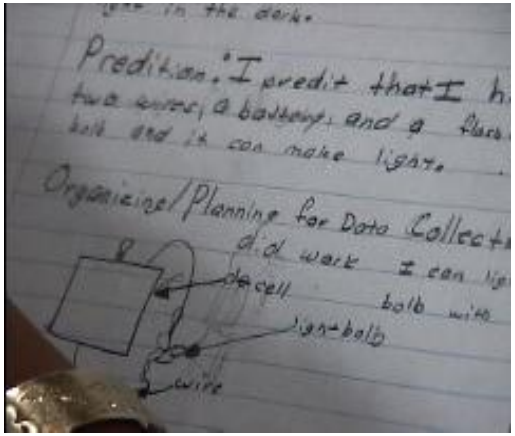
RAISE	Scientist's Notebook Model Effective Conclusion Writing
Writing Prompt	Engaging Scenario for investigation
Focus/Essential Question for Writing	Focus/Essential Question that was investigated
Restate Students are to use (restate) the words from their question	Student rewrites the question as a declarative statement to begin their response.
Answer Students write the required amount of answers to the question	Students re-state their prediction/hypothesis that is a response to the focus/essential question and state what they thought would happen in the investigation and why they thought that answer to the focus question.
Include**:**	Students include in the body of their conclusion:
Support with Evidence: Students must support (prove) each and every answer with evidence from the text used. (This is the most important and most challenging part of construted-response!)	Students include their claims/inferences based on their evidence recorded in their investigation. They also include when appropriate other student claims that may have differed from their own and comment on why there may have been differences. They include description of their analysis of their data.
Extend: Students give extra thought about the answer;this can be analysis, judgement, or personal connection to the text.	Students provide reflections on their investigation including analysis of how they might improve their investigation and/or other questions that they might research. At secondary grades students should consider sources of error in measurements, etc. Students provide closure to their conclusion by restating again the beginning of their response in different words….but, beginning this final sentence/statement with the words "In conclusion…"

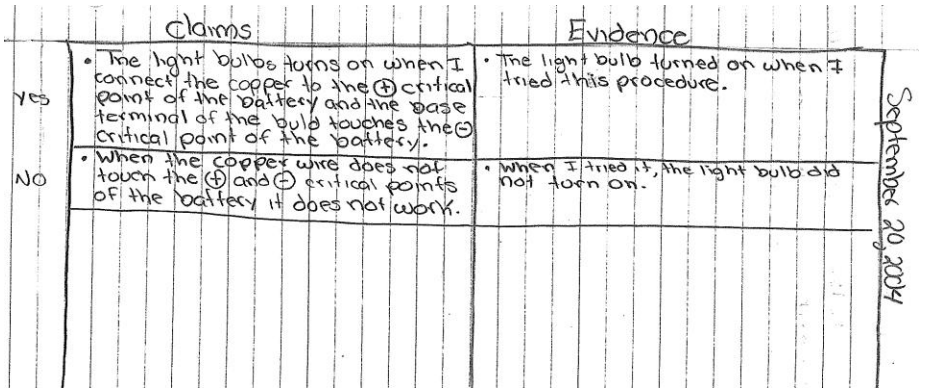
Science conclusions should be developmentally appropriate and consistent with expectations of other content areas. Conclusions should be three or more paragraphs including paragraphs devoted to: Focus/Controlling idea, Evidence & Claims details, and paragraph(s) that focus on analysis done, and reflections.

- The primary formative assessment device to be used at the elementary level is the strategic use of science notebooks and related entries as shown below. Quality effective and timely feedback to students is critical to improving student achievement. The notebooks provide that opportunity.

- The use of NE#CAP-RI released tasks with students also provide an excellent opportunity to provide formative assessment.

Science Notebook or Journals Student Entry Types-*The Reading & Writing Connection*





Science notebooks contain information about students' classroom experiences as they construct scientific knowledge/concepts. They are used much as scientists would, before, during, and after all investigations. They are a place where students formulate and record their questions, make predictions, record data, procedures, and results, compose reflections, and communicate findings. Most importantly, notebooks provide a place for students to record new concepts they have learned.

The research supporting the use of notebooks is extensive but, here are a few resources that support this important facet of instruction. Klentschy, M. and Molina-De La Torre, E. (2004). Students' science notebooks and the inquiry process. In W. Saul (Ed.). Crossing Borders in Literacy and Science Instruction: Perspectives on Theory and Practice. Newark, DE: International Reading Association Press. Students benefit from strong scaffolding with respect to building explanations from evidence (Songer and Lee, 2003)

Further, by reviewing hundreds of actual student notebooks, a group of education leaders from the East Bay Educational Collaborative, Dr. Michael Klentschy, and others from Washington State explored how teachers were asking students to record their ideas in their science notebooks. Analysis of the student work revealed eight distinct strategies or "entry types," used most frequently by practicing K-12 teachers. The following describes those eight entry types and offers a rationale for why a teacher might select a given entry type. These types of entries are particularly important to connect science to reading and particularly writing.

Entry Type	***Definition and Purpose***
Glossary Development by Students	In conjunction with a "Word Wall" or "Object Wall" (which is the same except whenever possible the actual object is also clipped to the wall especially at lower grades and where English Language Learners are present) students develop their own definitions asnew words are used in context of investigations and classroom activities.
Drawings	*Definition* Student generated drawings of materials, scientific investigation set-up, observations, or concepts. Three common types of drawings used in science notebooks include: 1. Sketches: Informal pictures of objects or concepts created with little detail. 2. Scientific Illustrations: Detailed, accurate, labeled drawings of observations or concepts. 3. Technical Drawings: A record of a product in such detail that someone could create the product from the drawings.
	Purpose Students use drawings to make their thinking and observations of concrete or abstract ideas visible. Drawings access diverse learning styles, allow entry to the writing process for special needs students and emergent writers, and assist in vocabulary development (e.g. oral explanations, group discussions, labels).
Tables, Charts, and Graphs	*Definition* Formats for recording and organizing data, results, and observations.
	Purpose Students use tables and charts to organize information in a form that is easily read and understood. Recording data in these forms facilitates record keeping. Students use graphs to compare and analyze data, display patterns and trends, and synthesize information to communicate results.

Graphic Organizers	*Definition* Tools that illustrate connections among and between ideas, objects, and information. Examples include, but are not limited to, Venn diagrams, "Box–and-T" charts, and concept maps.
	Purpose Graphic organizers help students organize ideas to recognize and to communicate connections and relationships.
Notes and Practice Problems	*Definition* A record of ideas, observations, or descriptions of information from multiple sources, including but not limited to direct instruction, hands-on experiences, videos, readings, research, demonstrations, solving equations, responding to guiding questions, or developing vocabulary.
	Purpose Students use notes and practice problems to construct meaning and practice skills for current use and future reference.
Reflective and Analytical Entries	*Definition* A record of a student's *own* thoughts and ideas, including, but not limited to initial ideas, self-generated questions, reflections, data analysis, reactions, application of knowledge to new situations, and conclusions.
	Purpose Students use reflective and analytical entries to think about scientific content from their *own* perspective, make sense of data, ask questions about their ideas and learning processes, and clarify and revise their thinking.
Inserts	*Definition* Inserts are artifacts placed within a notebook, including, but not limited to photographs, materials (e.g. flower petals, crystals, chromatography results), and supplemental readings (e.g. newspaper clippings).
	Purpose Students use inserts to document and to enrich their learning.

Investigation Formats	*Definition* Scaffolds to guide students through a controlled investigation, field investigation, or design process. Examples include, but are not limited to investigation planning sheets or science writing heuristics.
	Purpose Students use investigation formats to guide their thinking and writing while they design and conduct investigations. Students also use these formats to reflect on and discuss their findings and ideas.
Writing Frames	*Definition* Writing prompts used to focus a student's thinking. Examples include, but are not limited to, "I smelled…I felt…I observed…","My results show…", "The variable I will change is…", or "I think that because…".
	Purpose Students use frames to organize their ideas, prompt their thinking, and structure their written response. Frames help students become more proficient in scientific writing and less reliant upon the prompts.

Further, the following pedagogical model takes the use of notebooks to another level for students. It develops the ability of students to formulate claims or inferences based on evidence as scientists do and constant with the new Common Core Standards.

Specific examples of teacher strategies for Scientist's Notebook and other science-literacy connections used by classroom teachers may be found at EBEC's website:

http://ebecri.org/content/checklists

The "Scientist's Notebook" Model of Instruction K-12

Constructing scientific knowledge is not a casual but a purposeful activity based upon posing questions, determining claims, and providing evidence. K.A.Burke, Iowa State University **The Process of Using Inquiry and the Science Writing Heuristic***

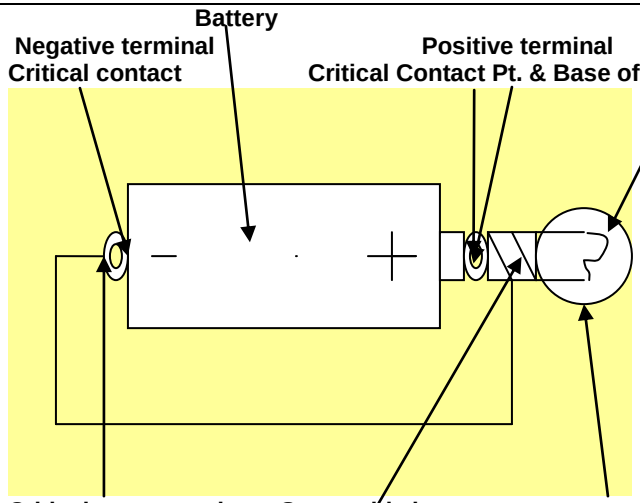
The "Scientist's Notebook" method used in science classes, as a model of instruction (K-12), incorporates and facilitates student scientific writing development based on their claims and supporting evidence for those claims. Students are asked to support any and all claims with evidence gleaned from their investigation of a ***focus question.*** Students share their claims and evidence in a ***"making meaning conference"*** prior to actually writing conclusions. This models the actual work of scientists as they investigate and share and report the results of their work.

Elements:

- Engaging Scenario: (Optional but it is based on the research of Madeline Hunter in literacy.
- Focus Question: (a question that is investigable.)
- Hypothesis/Prediction with reasoning for the prediction based on student prior knowledge.
- Planning: Procedures can be based on "guided inquiry" questions developed by the teacher or later "self-determined inquiry" where students develop their own procedures. Opportunities to differentiate instruction based on the needs of students can occur in classrooms such as providing an explicit procedure to Sp.Ed. students where they can "test" it for the rest of class.
- Data and Evidence: Graphic Organizer development with students, tables, graphs, written observations. Hint: Data may not always be evidence to support a claim. An example might be in an experiment to measure the boiling point of a liquid the length of the thermometer can be collected as data but, it is not evidence for the investigation.
- Claims and Evidence
- Making Meaning Conference: Develop class claims and evidence
- Conclusions and Reflections

SAMPLE Claims & Evidence

Components of a Scientist's Notebook Activity	Purpose	Writing Scaffold

I claim that: A complete circuit requires "critical contacts" at the positive and negative ends of a battery. Based on my investigation I found that: The base of the bulb is a critical contact point and the "screw threaded contact area" (anywhere) is a critical contact point to make the light bulb work.	 When we connected the bulb as shown above the light worked no matter where the wire touched the side area of the threaded base of the bulb as long as the base or bottom of the bulb was in contact with the positive end. It also worked when the ends of the battery were reversed. (reverse diagram) rsk-2005

Focus or Essential Question	The question provides a link to the engaging scenario, cannot be answered "yes" or "no" and is investigable	*How does…..?How can…?* *What does….?What can ..?* *Which….?*
Prediction	The prediction provides a reasonable explanation by the learner as to the result of the investigation. Using "because" also activates prior knowledge.	*I think …..will happen because……*
Planning -operational	The general plan determines which variable will be changed and which will be kept constant and what will be observed or measured. The operational plan describes the sequence of events and the materials that will be used to conduct the investigation.	*…. will be changed.* *…. will be kept the same.* *…. will be observed or measured.* operational *First…..* *Second…..* *Next ……* *Finally …..*
Data –	Data charts, tables, graphs and labeled diagrams and	How are we going to record what we are going to observe or

Observations/Measurements	illustrations	measure?
Claims/Evidence	Claims linked to the data collected or observed with justification.	*I know that …….* *I know this because….*
Conclusion	Revisit prediction. What was learned from the evidence?	*My evidence supports my prediction because …* *My evidence does not support my prediction because ….* *In conclusion, …* *Today I learned …*
Reflection	Provides an opportunity for the student to think about their thinking.	*Questions that I have now are ……. .I wonder if …….What really surprised me about this investigation was ….I used to think, but now I think….I know that I'm*

OTHER RESOURCES:

MISC. VOCABULARY Commonly Used on Elementary NECAP Science Test

Compare Contrast Characteristics Classify Describe Effects Fair Test Inherit Investigation Occur Properties Structure(s)

For Response Questions - Phrases Such As:

* Cite evidence

* Use your data to explain your answer.

* Explain how your data did or did not support your prediction

FOSS RESOURCES WITH KITS

FOSS Science Stories are original student books developed specifically to complement the FOSS modules. The books integrate reading and language arts skills in the context of learning science. With FOSS, students first explore science concepts through hands-on investigations. Then they extend and reinforce their classroom discoveries and vocabulary with FOSS Science Stories.

FOSS Science Stories for grades K-2 are designed around large, colorful, instructive photographs. The text relates directly to the images, calling attention to particular details, suggesting comparisons, and moving students to think critically about the images. The stories are written mainly in an expository format to help build essential reading skills. FOSS Science Stories for primary grades are available in student book and teacher big book editions.

FOSS Science Stories for grades 3 - 6 use a variety of writing styles, accompanied with full-color illustrations and photos to enrich the science experience. The literature styles include
Narrative tales. Fictional adventures in which the main characters have experiences that relate to the science that students learned in class.
Expository articles. Informative articles that increase students' knowledge about science.
Technical readings. Selections that describe detailed procedures and provide precise explanations of principles.
Historical accounts. Stories about important people and events that shaped the development of science and technology.

www.fossweb.com

The www.fossweb.com web site opens new horizons for teachers, students, and families, in the classroom or at home. Each grade 3 - 6 module has an interactive site where students and families can find instructional games and interactive simulations. Those interested in visiting web sites related to the content of any FOSS module can select a link and explore the subject in greater depth.

SCIENCE KIT TRADE BOOKS

The following are examples of books that have been used nationally in conjunction with FOSS science kit programs. A complete list is available in the school library. Although, not required they provide the opportunity to pursue related readings with specific kits.

Animals 2X2

About Reptiles: A Guide for Children
Author: **Cathryn P. Sill** - Illustrated by: **John Sill**
Level: **K-2** - Publisher: **Peachtree Press** - Year: **1999** - ISBN: **1-561-45183-5**
Description: Information about 15 reptiles is presented in brief sentences that describe their characteristics and habits. The afterword gives more details on the reptiles.

All Around Me I See
Author: **Laya Steinberg** - Illustrated by: **Cris Arbo**
Level: **K-2** - Publisher: **Dawn Publications** - Year: **2005** - ISBN: **1-58469-069-0**
Description: With eyes wide open to the mysteries of nature, a child on a hike discovers that "a leaf is a boat for a beetle" and that "a nest is a cradle for eggs." Tired from her long walk, she sleeps-and in her dream she flies like a bird and marvels at the beauty around her.

Animal Dads
Author: **Sneed B. Collard III** - Illustrated by: **Steve Jenkins**
Level: **K-2** - Publisher: **Sandpiper** - Year: **2000** - ISBN: **0-618-03299-1**
Description: The responsibilities of male parents in the wild are presented, featuring two levels of text. A read-aloud text is partnered with informative paragraphs that provide details for older readers.

Animal Patterns (Series)
Author: **Nathan Olson** - Illustrated by: **---**
Level: **K-2** - Publisher: **Capstone Press** - Year: **2007** - ISBN: **978-0-7368-6728-3**
Description: The animal patterns featured in this book can be as small as the parallel threads of a spider's web or as large as elephants walking in a line and forming a predictable configuration of alternating sizes.

Animals in Danger
Author: **Ellen Catala** - Illustrated by: **---**
Level: **K-1** - Publisher: **Capstone Press** - Year: **2006** - ISBN: **0-7368-5832-6**
Description: Learn what animals need to survive and how humans are disrupting their space and endangering their lives.

Animals in Winter
Author: **Martha Rustad** - Illustrated by: **---**
Level: **K-1** - Publisher: **Capstone Press** - Year: **2009** - ISBN: **978-1-4296-2200-4**
Description: In winter, animals go through many changes. See what else animals do during the winter season.

Animals Two By Two
Author: **Larry Lowery** - Illustrated by: **---**
Level: **K-3** - Publisher: **Delta Education** - Year: **2003** - ISBN: **0-7826-0722-5**
Description: Animals are presented two by two, and the reader is challenged to use observational techniques to differentiate between them. Available for purchase from Delta Education.

Are You A Snail?
Author: **Judy Allen, Tudor Humphries** - Illustrated by: **---**
Level: **K-2** - Publisher: **Kingfisher** - Year: **2000** - ISBN: **0-753-45242-1**
Description: A fun and informative book that introduces the life and characteristics of a backyard snail.

New Plants

Bread Is For Eating
Author: **David Gershator** - Illustrated by: **---**
Level: **K-3** - Publisher: **Henry Holt and Company** - Year: **1998** - ISBN: **0-8050-5798-6**
Description: Spanish and English are blended within this graceful narrative of the making of bread from grain to table.

Flowers
Author: **Vijaya Khisty Bodach** - Illustrated by: **---**
Level: **K-1** - Publisher: **Capstone Press** - Year: **2007** - ISBN: **978-0-7368-6342-1**
Description: Each part of a plant helps it grow and live. From roots to fruits, this book reveals in-the-soil and up-close looks at the amazing world of plants.

Growing Vegetable Soup
Author: **Lois Ehlert** - Illustrated by: **---**
Level: **1-2** - Publisher: **Harcourt Brace** - Year: **1990** - ISBN: **0-1523-2580-8**
Description: Children grow vegetables in their garden, harvest them, and make vegetable soup. Recipe included.

A Handful Of Sunshine
Author: **Melanie Eclare** - Illustrated by: **---**
Level: **1-3** - Publisher: **Ragged Bears** - Year: **2000** - ISBN: **1-929927-14-2**
Description: Beautiful photographs and simple words describe a young girl's experience as she plants a handful of sunflower seeds and cares for them as they grow into huge blossoms. Helpful instructions are included.

How A Seed Grows
Author: **Helene J. Jordan** - Illustrated by: **Loretta Krupinski**
Level: **K-5** - Publisher: **HarperCollins** - Year: **1992** - ISBN: **0-064-45107-0**
Description: In simple, clear text this book describes how a seed gets water, nutrients, and sunlight and highlights the life cycle of a bean plant. It offers instruction on how to plant bean seeds in eggshells and encourages the reader to observe their development. The bright detailed pictures dramatize how a little seed may become a flower, a vegetable, or even a huge oak tree.

The Life Cycle of a Bean (Series)
Author: **Linda Tagliaferro** - Illustrated by: **---**
Level: **K-2** - Publisher: **Capstone Press** - Year: **2007** - ISBN: **978-0-7368-6710-8**
Description: Watch small bean seeds grow into beans we eat. Learn about this vegetable's life cycle from start to finish

Air & Weather

Air Is Everywhere
Author: **Melissa Stewart** - Illustrated by: **---**
Level: **1-4** - Publisher: **Compass Point Books** - Year: **2004** - ISBN: **0-756-50638-7**
Description: Introduces the characteristics and importance of air through text, illustrations, and activities. Includes bibliography and index.

Caliente O Frio (Hot or Cold?)
Author: **Elena Martin** - Illustrated by: **---**
Level: **K-3** - Publisher: **Capstone Press** - Year: **2005** - ISBN: **0-7368-4129-6**
Description: Introduces objects that are either hot or cold, and invites the reader to identify hot or cold things around themselves. Spanish version.

Can You See The Wind?
Author: **Allan Fowler** - Illustrated by: **---**
Level: **1-2** - Publisher: **Scholastic Library** - Year: **1999** - ISBN: **0-516-26479-6**
Description: This simple reader describes how wind is created and how we can “see” it—in sand dunes, flags, trees, kites, and clouds.

Climates
Author: **Theresa Jarosz Alberti** - Illustrated by: **---**
Level: **1-3** - Publisher: **Capstone Press** - Year: **2005** - ISBN: **0-736-83735-3**
Description: Introduces the main climates on Earth, including tropical, temperate, polar, and dry climates.

The Cloud Book
Author: **Tomie dePaola** - Illustrated by: **Tomie DePaola**
Level: **K-2** - Publisher: **Holiday House** - Year: **1984** - ISBN: **0-823-40531-1**
Description: The ten most common types of clouds are identified by both their familiar and scientific names. They are introduced along with the myths that have been inspired by their shapes and what they indicate about the weather.

Cloud Dance
Author: **Thomas Locker** - Illustrated by: **---**
Level: **K-2** - Publisher: **Harcourt** - Year: **2003** - ISBN: **0-152-04596-1**
Description: Many kinds of clouds are depicted in Locker’s dramatic oil paintings and briefly described in poetic descriptions. Information at the back tells more about cloud formations.

Clouds
Author: **Gail Saunders-Smith** - Illustrated by: **---**

Level: **K-3** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2307-7**
Description: Describes different kinds of clouds--cirrus, cumulus, stratus and nimbus--and the types of weather they indicate.

Balance & Motion

Around and Around
Author: **Patricia J. Murphy** - Illustrated by: **---**
Level: **1-2** - Publisher: **Scholastic Library** - Year: **2002** - ISBN: **0-516-22550-2**
Description: Introduces circular movement and the forces that affect it.

Back and Forth
Author: **Lola M. Schaefer** - Illustrated by: **---**
Level: **1-2** - Publisher: **Pebble Books, Capstone Press** - Year: **2000** - ISBN: **0-7368-0398**
Description: Simple text and photographs provide examples of back-and-forth movement, including the pendulum in a clock, a child in a rocking chair, and a tree in the wind. 24 pages

Back and Forth
Author: **Patricia J. Murphy** - Illustrated by: **---**
Level: **1-2** - Publisher: **Scholastic Library** - Year: **2002** - ISBN: **0-516-22552-9**
Description: A simple introduction to back-and-forth movement.

Balances
Author: **Adele Richardson** - Illustrated by: **---**
Level: **K-3** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2516-9**
Description: Introduces the function, parts, and uses of balances, and provides instructions for two activities that demonstrate how a balance works.

The Bicycle
Author: **Larry Hills** - Illustrated by: **---**
Level: **2-5** - Publisher: **Fact Finders** - Year: **2005** - ISBN: **0-7368-2668-8**

I Fall Down
Author: **Vicki Cobb** - Illustrated by: **---**
Level: **K-3** - Publisher: **HarperCollins** - Year: **2004** - ISBN: **0-688-17842-1**
Description: Why do things fall down? In this book, illustrations and playful type lead you to explore how gravity works. With materials like molasses, sponges, soap, and rubber bands, the book suggests casual activities to play with both gravity and weight.

Inclined Planes
Author: **Michael S. Dahl** - Illustrated by: **---**
Level: **K-2** - Publisher: **Capstone Press** - Year: **1996** - ISBN: **1-560-65447-3**
Description: Describes many different kinds, uses, and benefits of inclined planes, and provides basic information about levers, inclined planes, pulleys, and wheels and axles.

Inclined Planes to the Rescue (Series)
Author: **Sharon Thales** - Illustrated by: **---**
Level: **1-3** - Publisher: **Capstone Press** - Year: **2007** - ISBN: **978-0-7368-6752-8**
Description: What do wheelchair ramps, slides, and roller coasters have in common? They're all inclined planes. Read Inclined Planes to the Rescue to learn what inclined planes are, how they work, and how these simple machines can save the day.

Insects

100 Things You Should Know About Insects and Spiders
Author: **Steve Parker, Jim Flegg** - Illustrated by: **---**
Level: **K-3** - Publisher: **Barnes and Noble Books** - Year: **2004** - ISBN: **0-760-75398-9**
Description: Detailed artwork reveals the amazing variety of silky spiders and intriguing insects. Includes puzzles, quizzes, and projects.

About Insects: A Guide for Children
Author: **Cathryn Sill** - Illustrated by: **John Sill**
Level: **1-3** - Publisher: **Peachtree** - Year: **2003** - ISBN: **1-561-45232-7**
Description: Explains the basic characteristics that all insects share, while offering a close look at a few of the many animals in this diverse category.

Ant Cities
Author: **Arthur Dorros** - Illustrated by: **---**
Level: **K-3** - Publisher: **HarperCollins Children's Books** - Year: **1988** - ISBN: **0-064-45079-1**
Description: Explains how ants live and work together to build and maintain their cities.

Are You a Bee?
Author: **Judy Allen** - Illustrated by: **Tudor Humphries**
Level: **K-2** - Publisher: **Kingfisher** - Year: **2004** - ISBN: **0-753-45804-7**
Description: Introduces the life cycle of bees and their behavior. Also compares a bee to a human.

Are You A Butterfly?
Author: **Judy Allen** - Illustrated by: **Tudor Humphries**
Level: **K-2** - Publisher: **Kingfisher** - Year: **2003** - ISBN: **0-753-45608-7**
Description: The clever and informative text introduces children to the life cycle of a butterfly, showing how it changes from an egg to a chrysalis to a butterfly.

Bananas!
Author: **Author: Jacqueline Farmer** - Illustrated by: **Page Eastburn O'Rourke**
Level: **K-5** - Publisher: **Charlesbridge** - Year: **1999** - ISBN: **0-881-06115-8**
Description: Describes the growth cycle, varieties, history, and nutritional value of bananas.

Bees
Author: **Deborah Hodge** - Illustrated by: **Julian Mulock**
Level: **K-2** - Publisher: **Kids Can Press** - Year: **2004** - ISBN: **1-553-37656-0**
Description: Learn about the life cycle of a bee as it grows from an egg to an adult. Discover how bees "talk" to one another.

Beetles
Author: **Deirdre A. Prischmann** - Illustrated by: **---**
Level: **K-2** - Publisher: **Capstone Press** - Year: **2005** - ISBN: **0-736-83706-X**
Description: A brief introduction to beetles, discussing their characteristics, habitat, life cycle, and predators. Includes a range map, life-cycle illustration, and facts.

Pebbles, Sand, & Silt

Archaeologists Dig for Clues
Author: **Kate Duke** - Illustrated by: **---**
Level: **K-5** - Publisher: **HarperCollins** - Year: **1997** - ISBN: **0-064-45175-5**
Description: A boy and his friends go on a dig in a local cornfield with their archaeologist friend Sophi and make discoveries about how scientists learn about the past. They learn that small pieces of stone, bone, or fossils are clues to long ago.

Be a Friend to Trees
Author: **Patricia Lauber** - Illustrated by: **Holly Keller**
Level: **K-5** - Publisher: **HarperCollins** - Year: **1994** - ISBN: **0-064-45120-8**
Description: This easy-to-read book discusses the importance of trees as sources of food and oxygen for people and wild animals. Diagrams and full-color labeled illustrations complement the text. The author recommends actions such as conserving and recycling paper.

Best Book Of Fossils, Rocks, And Minerals
Author: **Chris Pellant** - Illustrated by: **---**
Level: **2-4** - Publisher: **Larousse Kingfisher Chambers** - Year: **2000** - ISBN: **0-7534-5274-X**
Description: A colorfully illustrated overview of different kinds of rocks and minerals with suggestions on how to start and organize a rock collection.

The Big Rock
Author: **Bruce Hiscock** - Illustrated by: **---**
Level: **K-5** - Publisher: **Aladdin** - Year: **1999** - ISBN: **0-689-82958-2**
Description: This concept book tells how a large granite rock in the forest came to be and its changes over time. Geological terms are explained and can be enhanced with teacher support. Full-page, realistic illustrations help to clarify the story.

Clay
Author: **Mary Firestone** - Illustrated by: **---**
Level: **K-3** - Publisher: **---** - Year: **2005** - ISBN: **0-7368-2649-1**
Description: Discusses where clay comes from, its features and how it is used.

Digging Up Dinosaurs
Author: **Aliki** - Illustrated by: **---**
Level: **K-2** - Publisher: **HarperCollins** - Year: **1988** - ISBN: **0-064-45078-3**
Description: Introduces various types of dinosaurs whose skeletons and reconstructions are seen in museums. Explains how scientists uncover, preserve, and study fossilized dinosaur bones.

Building with Shapes
Author: **Rebecca Weber** - Illustrated by: **---**
Level: **K-3** - Publisher: **Compass Point Books** - Year: **2005** - ISBN: **0-756-50655-7**
Description: Find out about the variety of shapes humans use in building structures, including cubes, domes, cones, arches and more.

Drop of Water: A Book of Science and Wonder
Author: **Walter Wick** - Illustrated by: **---**
Level: **K-8** - Publisher: **Scholastic** - Year: **1997** - ISBN: **0-590-22197-3**
Description: Dramatic stop-action photography helps explain various properties of water such as surface tension, adhesion, capillary attraction, molecular motion, freezing, evaporation, and condensation.

Everything Is Matter!
Author: **David Bauer** - Illustrated by: **---**
Level: **K-2** - Publisher: **Capstone Press** - Year: **2004** - ISBN: **0-736-82942-3**
Description: Offers a very simple introduction to the three states of matter.

Everything Is Matter! (Spanish)
Author: **David Bauer** - Illustrated by: **---**
Level: **Pre-K-3** - Publisher: **Capstone Press** - Year: **2005** - ISBN: **0-7368-4160-1**
Description: A very simple introduction to the three states of matter.

Ice
Author: **Helen Frost** - Illustrated by: **---**
Level: **Pre-K-2** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2094-9**
Description: Simple text and photographs present ice, how it is formed, and how it affects the Earth and people.

Is It Rough? Is It Smooth? Is It Shiny?
Author: **Tana Hoban** - Illustrated by: **---**
Level: **1-2** - Publisher: **Morrow/Greenwillow Books** - Year: **1984** - ISBN: **0-688-0382-39**
Description: Color photographs without text introduce objects of many different textures, such as pretzels, foil, hay, mud, a kitten, and bubbles. 32 pages

Kid's Cooking: A Very Slightly Messy Manual
Author: **Klutz Press** - Illustrated by: **---**
Level: **1-2** - Publisher: **Klutz Press** - Year: **1987** - ISBN: **0-932592-14-7**
Description: A cookbook that includes 45 kid-tested recipes for easy-to-make kitchen crafts and cuisine, such as giant soap bubbles, play dough, finger paint, and "not-so-sloppy joes." 78 pages

America's Wetlands
Author: **Frank Staub** - Illustrated by: **---**
Level: **4-8** - Publisher: **Carolrhoda Books** - Year: **1995** - ISBN: **0-876-14-827-5**
Description: Describes wetland environments, how to recognize them, and why some wetlands aren't always wet. Introduces a wide variety of plants and animals that depend on wetlands. Color photographs.

Clouds
Author: **Gail Saunders-Smith** - Illustrated by: **---**
Level: **K-3** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2307-7**
Description: Describes different kinds of clouds--cirrus, cumulus, stratus and nimbus--and the types of weather they indicate.

Do You Know Where Your Water Has Been? The Disgusting Story Behind What You're Drinking
Author: **Kelly Barnhill** - Illustrated by: **---**
Level: **3-4** - Publisher: **Capstone Press** - Year: **2009** - ISBN: **978-1-4296-1995-0**
Description: Would you drink water out of a dirty lake or stream? Even if it looks clean, untreated water can have deadly bacteria in it. Discover the nasty effects of unclean water and learn about the process by which clean, clear water gets to your tap.

A Drop of Water
Author: **Walter Wick** - Illustrated by: **---**
Level: **K-8** - Publisher: **Scholastic** - Year: **1997** - ISBN: **0-590-22197-3**
Description: Dramatic stop-action photography helps illustrate the properties of water in its various states—ice, steam, frost, dew, and rainbow—and supplies basic explanations of related scientific terms and phenomena, including capillary attraction and surface tension.

Hurricanes
Author: **Seymour Simon** - Illustrated by: **---**
Level: **2-8** - Publisher: **HarperCollins** - Year: **2003** - ISBN: **0688162916**
Description: Describes the formation of hurricanes, the effects of heavy winds and rain, and the damage caused by flooding after a hurricane has passed. Satellite images and full-color photographs are included, as well as stories about hurricanes, including Andrew, Camille, and Floyd.

Hydroelectric Power
Author: **Josepha Sherman** - Illustrated by: **---**
Level: **3-5** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2472-3**
Description: Introduces the history, uses, production, advantages and disadvantages, and future of hydroelectric energy as a power resource. Includes bibliography and index.

Ideas & Inventions

Accidents May Happen
Author: **Charlotte Foltz Jones** - Illustrated by: **John O'Brien**
Level: **4-6** - Publisher: **Delacorte Books** - Year: **1998** - ISBN: **038-5322-402**
Description: Describes how such everyday items as ice-cream sodas, microwave ovens, and yo-yos were invented or discovered accidentally, in a humorous fact book that is complemented by jokes and sidebars.

The Airplane
Author: **Julie L. Sinclair** - Illustrated by: **---**
Level: **3-5** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2213-5**
Description: Explore the history of the airplane and discover how this great invention developed into the aircraft we use today.

The Automobile
Author: **Julie L. Sinclair** - Illustrated by: **---**
Level: **3-5** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2214-3**
Description: Explore the history of the automobile and discover how this great invention developed into the cars we use today.

The Bicycle
Author: **Larry Hills** - Illustrated by: **---**
Level: **2-5** - Publisher: **Fact Finders** - Year: **2005** - ISBN: **0-7368-2668-8**
Description: Introduces the history and development of the bicycle and explains how a bicycle works.

Brainstorm! The Stories Of Twenty American Kid Inventors
Author: **Tom Tucker** - Illustrated by: **Richard Loehle**
Level: **3-6** - Publisher: **Farrar, Straus and Giroux** - Year: **1995** - ISBN: **0-374-30944-2**
Description: An excellent resource about kids whose creativity and imagination led them to invent many useful things.

The Camera
Author: **Larry Hills** - Illustrated by: **---**
Level: **-5** - Publisher: **Fact Finders** - Year: **2005** - ISBN: **0-7368-2669-6**
Description: Introduces the history and development of the camera and explains how a film camera works.

The Computer
Author: **Gayle Worland** - Illustrated by: **---**
Level: **3-5** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2215-1**

Earth Materials

Crystal and Gem
Author: **R. F. Symes, R. R. Harding** - Illustrated by: **---**
Level: **3-6** - Publisher: **DK Publishing (Eyewitness Book)** - Year: **2007** - ISBN: **0-756-63001-0**
Description: Photos show the natural beauty of crystals of every size, shape, and color.

Fossil Fuel Power
Author: **Josepha Sherman** - Illustrated by: **---**
Level: **3-5** - Publisher: **---** - Year: **2004** - ISBN: **0-7368-2470-7**
Description: Introduces the history, uses, production, advantages and disadvantages, and future of fossil fuel energy as a power resource.

Let's Go Rock Collecting
Author: **Roma Gans** - Illustrated by: **Holly Keller**
Level: **K-4** - Publisher: **HarperCollins** - Year: **1997** - ISBN: **0-064-45170-4**
Description: Discusses the formation and characteristics of igneous, metamorphic, and sedimentary rocks and how to recognize and collect them.

Let's Look at Rocks (Spanish)
Author: **Jeri Cipriano** - Illustrated by: **---**
Level: **Pre-K-3** - Publisher: **Capstone Press** - Year: **2005** - ISBN: **0-7368-4161-X**
Description: Simple text and photographs introduce rocks, where they can be found, some formations they make, and how people use rocks.

Matter & Energy

Atoms
Author: **Cindy Devine Dalton, Ed Sikora, Teresa Sikora, Kathleen Carreiro** - Illustrated by: **---**
Level: **1-4** - Publisher: **Rourke Publishing** - Year: **2001** - ISBN: **1-589-52010-6**
Description: An excellent starting point for primary students learning the concepts of atoms, atomic energy, and matter.

Color
Author: **Ellen Sturm Niz** - Illustrated by: **---**
Level: **K-3** - Publisher: **Capstone Press** - Year: **2006** - ISBN: **0-7368-5400-2**
Description: Color fills the world around us. Learn in this book how we see color and how different objects can be different colors.

Day Light, Night Light: Where Light Comes From
Author: **Franklyn M. Branley** - Illustrated by: **Stacey Schuett**
Level: **K-2** - Publisher: **HarperCollins** - Year: **1998** - ISBN: **0-064-45171-2**
Description: Describes the physical properties of light. A child observes light from a jar of fireflies and candles on a birthday cake as examples of light coming from sources of heat.

Did You Hear That?
Author: **Caroline Arnold** - Illustrated by: **Cathy Trachok**
Level: **3-5** - Publisher: **Charlesbridge** - Year: **2001** - ISBN: **1-570-91405-2**
Description: Visit the fascinating world of animals that create and hear sounds either too high or too low for human ears. Without these abilities, they wouldn't be able to communicate, hunt, or avoid being hunted.

A Drop of Water
Author: **Walter Wick** - Illustrated by: **---**
Level: **K-8** - Publisher: **Scholastic** - Year: **1997** - ISBN: **0-590-22197-3**
Description: Dramatic stop-action photography helps illustrate the properties of water in its various states—ice, steam, frost, dew, and rainbow—and supplies basic explanations of related scientific terms and phenomena, including capillary attraction and surface tension.

Energy and Power
Author: **Rosie Harlow, Sally Morgan** - Illustrated by: **---**
Level: **3-8** - Publisher: **Houghton Mifflin** - Year: **2002** - ISBN: **0-753-45502-1**
Description: Explains what energy is and how we use it. Covers our use of both renewable and nonrenewable resources, as well as various forms of alternative energy.

Magnetism & Electricity

Alexander Graham Bell: An inventive Life
Author: **Elizabeth MacLeod** - Illustrated by: **Barbara Spurll**
Level: **3-5** - Publisher: **Kids Can Press** - Year: **1999** - ISBN: **1-550-74456-9**
Description: This biography follows Bell's life from his birth in Scotland through his many inventions and achievements, and concludes with his last few experiments and his death at his home in Canada. Equal attention is given to all of Bell's interests, such as his devotion to advancements for the hearing impaired and his later interest in flight. The subject, his family, and sketches of his many inventions appear in photos and reproductions.

Always inventing: A Photobiography of Alexander Graham Bell
Author: **Tom L. Matthews** - Illustrated by: **---**
Level: **3-5** - Publisher: **National Geographic Society** - Year: **1999** - ISBN: **0-792-27391-5**
Description: This biography has photographs and quotes from Bell himself. It follows this well-known inventor from his childhood in Scotland through his lifelong efforts to come up with ideas that would improve people's lives.

Awesome Experiments in Electricity and Magnetism
Author: **Michael Dispezios** - Illustrated by: **Matt Lefleur, Catherine Leary**
Level: **4-6** - Publisher: **Sterling Publishing Co.** - Year: **1999** - ISBN: **0-806-99819-9**
Description: More than 70 experiments explore electric charges, static electricity, currents, circuits, switches, and magnetism. Each one includes a brief introduction, a list of materials, directions, and a scientific explanation of the results.

Batteries, Bulbs, And Wires
Author: **David Glover** - Illustrated by: **---**
Level: **3-6** - Publisher: **Kingfisher Books/Larousse Kingfisher Chambers** - Year: **2002** - ISBN: **0-753-45510-2**
Description: The hands-on projects in this book explore electricity and its origins, from simple magnets to creating a circuit or a motor.

Benjamin Franklin's Adventures With Electricity
Author: **Beverly Birch, Robin Bell Corfield** - Illustrated by: **---**
Level: **3-6** - Publisher: **Barron's Educational Series** - Year: **1995** - ISBN: **0-8120-9790-4**
Description: The story of how Ben Franklin found a way to protect people from the dangers of lightning and opened the way for later generations to harness electrical energy.

Environments

Acid Rain
Author: **Louise Petheram** - Illustrated by: **---**
Level: **3-5** - Publisher: **Capstone Press** - Year: **2002** - ISBN: **0-736-81360-8**
Description: The book presents the truth behind acid rain, explains the real situation, and describes some practical solutions.

At Home In The Rainforest
Author: **Diane Willow** - Illustrated by: **Laura Jacques**
Level: **K-3** - Publisher: **Charlesbridge Publishing** - Year: **1991** - ISBN: **0-881-06485-8**
Description: From the tops of the tropical trees to the forest floor, this book shows the interrelationships of plants and animals that thrive at each level of an Amazonian rain forest.

The Case Of The Mummified Pigs, And Other Mysteries In Nature
Author: **Susan E. Quinlan** - Illustrated by: **Jennifer Owings Dewey**
Level: **4-6** - Publisher: **Boyds Mills Press** - Year: **1999** - ISBN: **1-563-97783-4**
Description: Interesting stories about phenomena in the nature that are explained by scientific research.

The Chimpanzees I Love: Saving Their World and Ours
Author: **Jane Goodall** - Illustrated by: **---**
Level: **3-7** - Publisher: **Scholastic** - Year: **2001** - ISBN: **0-439-21310-X**
Description: Goodall explains her findings about chimp communities and communication, the role of hierarchies, and what sort of threats chimpanzees face today. Her account also relates some of her mistakes, such as when she became too close to her subjects and interfered with h Landforms

America's National Parks: The Spectacular Forces That Shaped Our Treasured Lands
Author: **Paul Schullery** - Illustrated by: **---**
Level: **5-12** - Publisher: **Tehabi Books/DK Publishing** - Year: **2001** - ISBN: **0 7894 8016 6**
Description: Fifty-six of America's national parks are captured in the photo filled book. It includes interesting, easy to understand background on the geological and ecological forces that continue to make each national park worthy of protection. As one reviewer suggests, "… America's National Parks is a must have for anyone who relishes America's natural wonders and wants to learn more about the powerful forces that created them."

Canyons
Author: **Christine Webster** - Illustrated by: **---**
Level: **2-4** - Publisher: **Capstone Press** - Year: **2005** - ISBN: **0-736-83711-6**
Description: Describes canyons, including how they form, plants and animals in canyons, how people and weather change canyons, canyons in North America, and canyons of the world.

The Earth-Shaking Facts about Earthquakes with Max Axiom, Super Scientist (Series)
Author: **Katherine Krohn** - Illustrated by: **Tod Smith and Al Milgrom**
Level: **3-4** - Publisher: **Capstone Press** - Year: **2008** - ISBN: **978-1-4296-1328-6**
Description: Max Axiom is a super-cool-scientist. Using powers he acquired in a freak accident, Max demonstrates and explains the science of earthquakes.

From Lava to Life (Trilogy)
Author: **Jennifer Morgan** - Illustrated by: **Dana Lynne Andersen**

Level: **3-5** - Publisher: **Dawn Publications** - Year: **2003** - ISBN: **1-58469-042-9**
Description: "Once upon a time" meets science in a children's picture book that tells the story of how life began on Earth. The second in a trilogy of Universe stories - the first being Born with a Bang: The Universe Tells Our Cosmic Story-- this book picks up the story with the first appearance of life on Earth.

Mixtures and Solutions

Aluminum
Author: **John Farndon** - Illustrated by: **---**
Level: **3-5** - Publisher: **Benchmark Books** - Year: **2000** - ISBN: **0-761-40947-5**
Description: A review of the periodic table, specifically noting where aluminum belongs. Explains how aluminum is purified, how it is used, and why recycling aluminum is important. Includes a glossary and index.

Atoms
Author: **Melissa Stewart** - Illustrated by: **---**
Level: **3-5** - Publisher: **Compass Point Books** - Year: **2003** - ISBN: **0-7565-0441-4**
Description: The full-color books in the Simply Science series explains the key concepts of atoms in an easy-to-understand way.

Chemical Chaos
Author: **Nick Arnold** - Illustrated by: **Tony De Saulles**
Level: **4-8** - Publisher: **Scholastic** - Year: **1997** - ISBN: **0-590-10885-9**
Description: A wacky look at chemistry with fact files and experiments.

What Is the World Made of? All about Solids, Liquids, and Gases
Author: **Kathleen Weidner Zoehfeld** - Illustrated by: **Paul Meisel**
Level: **K-2** - Publisher: **HarperCollins** - Year: **1998** - ISBN: **0-613-12263-1**
Description: Introduces young readers to the differences between solids, liquids, and gases.

What's Smaller than a Pygmy Shrew?
Author: **Robert E. Wells** - Illustrated by: **---**
Level: **3-4** - Publisher: **Albert Whitman** - Year: **1995** - ISBN: **0-807-58838-5**
Description: The composition of smaller and smaller particles is explored. Includes illustrations of paramecia, bacteria, molecules, atoms, electrons, protons, neutrons, and quarks and explains that in order to view these a special microscope is needed. Includes a small glossary.