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

Fourth Grade Science Curriculum

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

Acknowledgments

North Smithfield District Science Curriculum Committee

Clare Arnold, North Smithfield District Curriculum Director

Jean Gaulin, Grade Two Teacher
Karen Kiment, Grade Four Teacher
Alyssa Koerner, Grade One Teacher
Monica Maroney, Grade Five Teacher
Lisa Silvestri, Kindergarten Teacher
Kristin Stone, Grade Three Teacher

Colleen Converse, Middle School
Sarah Dupre, Middle School
Jane Franklin, Middle School
Lynn Hannah, Middle School
Gale O'Keefe, Middle School
Tina Shepherd, Middle School

East Bay Educational Collaborative Consultants
Science Specialists:
Ron DeFronzo, Ronald Kahn, Jeff Soares, & Anthony Rabaiotti

Tracy Bailey-Gates, High School
Shawn Bailey-Gates, High School
Clete Garriott, High School
Bettilou LaRoche, High School
Lauren Nelson, High School
Laura Petsching, High School

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.