SCOPE & SEQUENCE CREATED BY TEACHERS, FOR THE TEACHERS OF SRC

"Give the pupils something to do; not something to learn; and if the doing is of such a nature as to demand thinking; learning naturally results."
~John Dewey

SANTA ROSA
COUNTY DISTRICT SCHOOLS

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How to Use This Planning Tool

The Scope and Sequence has been created by the Math & Science Department with a team of SRC teachers of the corresponding grade level, to help plan for meaningful instruction of science.

Format: Included is the **Benchmark**/standard from the FLDOE course description with the **Item Specifications**, which illustrate the fundamental knowledge and understanding needed for mastery, and the **Content Limits,** so that the teacher does not over-teach the standard.

Resources are also provided and differ depending on the grade level, as the emphasis in some grades is on writing, while others may be on reading. All resources, including the text, are considered part of the teacher's toolbox, and should be used appropriately to provide a hands-on, questioning, and science rich learning environment for the students.

The importance of Grades K-2 Science instruction: The content covered in Grades K-2 lays the foundational framework for future science study and is crucial to success in Grades 3-5. In most cases, K-2 is the first time that a science concept is taught, then it is taught one more time in 3-5 and assessed in 5th grade in the state assessment; WOW!! The misconceptions that need to be broken, and the foundations that need to be laid in K-2 are so important! You are our first line. Let our little ones ask questions, explore and see how the world around them works. You can do it! It takes work, but it can be done.

NSTA states that that “elementary students learn science best when –

a. They are involved in first-hand exploration and investigation and inquiry/process skills are nurtured.
b. Instruction builds directly on the student’s conceptual framework.
c. Content is organized based on broad conceptual themes common to all science disciplines.
d. Mathematics and communication skills are an integral part of science instruction.”

Integration of Nature of Science standards: The Big Ideas focusing on the Nature of Science should be consistently fused with content units as appropriate for your students throughout the year. It is covered alone in the first unit but needs to be continually reinforced throughout the year. Know your Nature of Science Standards.

Next Generation Sunshine State Standards

The Next Generation Sunshine State Standards for science are organized *by grade level* for grades K-8 and *by Bodies of Knowledge* for grades 9-12. Eighteen Big Ideas are encompassed in grades K-12 and build in rigor and depth as students advance.
Each grade level includes benchmarks from the four Bodies of Knowledge (Nature of Science, Life Science, Earth and Space Science, and Physical Science).

First Grade Overview

First Grade focuses instructional delivery for science within the following nine (9) Big Ideas/Standards: The concepts in italics are newly introduced this year.

<u>Nature of Science:</u>

Big Idea 1 – The Practice of Science

- **Observations**
- **Keeping records (pictorial and written)**
- **Compare observations with others**
- **Draw conclusions based on evidence (How do you know?)**

Earth and Space Science:

Big Idea 5 – Earth in Space and Time

- Explore gravity – dropped things fall
- Pattern of day/night
- Sun during day/moon mostly at night
- Perspective from Earth
- Gravity works even though nothing is touching the object
- Stars are infinite
- Magnifiers (telescopes)
- Benefits/dangers of the Sun

Big Idea 6 – Earth Structures

- Things found on Earth's surface (living and nonliving)
- Water is a basic need/water safety
- Some things happen fast, some things happen slowly

Physical Science:

Big Idea 8 – Properties of Matter

- Sort by: size, shape, color, temperature, (hot, cold), weight (heavy/light), texture, and sink and float

Big Idea 12 – Motion of Objects

- Things move in different ways (fast, slow, etc.)
- Ways objects move: straight line, zig-zag, back-and-forth, round-and-round

Big Idea 13 – Forces and Changes in Motion

- **Push/pull causes change in motion**
- **Ways to cause change motion is to apply push-pull**

<u>Life Science</u>

Big Idea 14 – Organization and Development of Living Organisms

- **5 senses and related body parts**
- **No personification**
- **Differences in plants and animals (structures and behaviors)**
- **Using senses to make observations**
- **Major parts of plants**
- **Living vs. non-living**

Big Idea 16 – Heredity and Reproduction

- **Plants and animals resemble their parents, but variations occur**

Big Idea 17 – Interdependence

- **Basic needs of plants and animals**

Santa Rosa County Science Teacher's 1st Grade Suggested Instructional Scope and Sequence

1st Quarter	**Week 1 – 5**	**Week 6 - 9**
	How Scientists Work	**Nature of Science Technology All Around Us**
	Unit 1 in text Big Idea: The Practice of Science *Standards:* **SC.1.N.1.1** (raise questions); **SC.1.N.1.2** (use 5 senses to observe, describe and compare); **SC.1.N.1.3** (keep records); **SC.1.N.1.4** (ask "how do you know?")	**Unit 2 in text** Big Idea: The Practice of Science *Standards:* **SC.1.N.1.1** (raise questions); **SC.1.N.1.2** (use 5 senses to observe, describe and compare); **SC.1.N.1.3** (keep records); **SC.1.N.1.4** (ask "how do you know?")

2nd Quarter	**Week 10 – 12**	**Week 13 – 18**
	Matter	**Physical Science : Motion**
	Unit 5 in text Big Idea: Properties of Matter *Standard:* **SC.1.P.8.1** (sort objects) **Use upcoming Halloween candy as an idea ☺	**Unit 6 in text** Big Ideas: Motion of Objects and Forces & Changes in Motion *Standards:* **SC.1.P.12.1** (demonstrate and describe the ways that objects move); SC.1.P.13.1 (demonstrate what pushes and pulls do)

3rd Quarter	Week 19 – 23		Week 24 – 28	
	Objects in the Sky		**Earth's Resources**	
	Unit 3 in text Big Idea: Earth in Space & Time Standards: **SC.1.E.5.1** (observe & discuss the stars); **SC.1.E.5.2** (explore gravity); **SC.1. E. 5.3** (investigate magnifiers); **SC.1.E.5.4** (Identify properties of the Sun)		**Unit 4 in text** Big Idea: Earth Structures *Standards:* **SC.1.E.5.3** (investigate magnifies); **SC.1.E.6.1** (recognize what composes the Earth's surface – rocks, water, soil, living things); SC.1.E.6.2 (describe the need for water; safety); **SC.1.E.6.3** (recognize that some things happen fast and some slow) ***Start growing some plants for next unit ☺	
4th Quarter	**Week 29 – 31**	**Week 32 – 33**	**Week 34 – 35**	**Week 36 – 38**
	Living Things	**Living Things & Their Parents**	**Plant & Animal Needs**	**Putting it ALL together**
	Unit 7 in text Big Idea: Organization & Development of Living Organisms *Standards:* **SC.1.L.14.1** (make observation of living things); **SC.1.L.14.2** (identify parts of the plants); **SC.1.L.14.3** (differentiate between living and nonliving)	**Unit 8 in text** Big Idea: Heredity & Reproduction *Standard:* SC.1.L.16.1 (make observations about parents and offspring)	**Unit 9 in text** Big Idea: Interdependence Standard: SC.1.L.17.1 (recognize – by observation-the basic needs of living things)	**ENRICHMENT**

First Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Nature of Science/Life Science Unit of Study: How Scientists Work			(5 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
How Scientists Work	*Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.* ***Students will:*** • **engage** as scientists using the following inquiry skills: • **observe** three similar objects and record the number of parts you see (e.g., number of flower petals, number of wheels on toy cars, number of sides on shapes). • **estimate and measure** the length of objects found in the classroom using rulers, tape measures, yardsticks (inches) and meter sticks (centimeters). • **estimate and measure** the weight of an object using nonstandard units of measure (e.g., pennies, teddy bear counters, color cubes). • **compare** the weight (heavy/light) of two objects in the classroom using a balance. • **predict** the number of an object that will fit into containers of different sizes and shapes such as beans, marbles, dice, etc. • **sort and classify** a group of objects by the way they move and compare results with others. • **communicate** the look and feel of objects with a partner. • **investigate** by comparing the descriptions of two or more different kinds of matter (e.g., two rocks, two soil types, two animals). • **make** a 2-dimensional and/or 3-dimensional model of an object. • **sequence** an event or a set of picture cards (e.g., someone making a cake).	**SC.1.N.1.1**	**answer** **balance** **centimeter(s)** **data** **explain** **explore** **identify** **inch(es)** **inquiry skills** o classify o communicate o compare o estimate o infer/inference o investigate o measure o model o observe o predict/prediction o sequence o sort

What Are Senses and Other Tools? **How Can We Use Our Senses?**	*Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.* *Keep records as appropriate—such as pictorial and written records of investigations conducted.* ***Students will:*** • **review** the five senses used for making observations (body structure and function). • **describe** an object's physical properties (e.g., number, shape, texture, size, odor, length, nonstandard weight, color, motion) using the five senses and/or science tools, including those that measure. • **keep records** (written or pictorial) of observations (data) during investigations using the five senses and science tools as appropriate (e.g., science notebook, simple table, class chart). • discuss observational similarities and differences made during investigations with others in the class.	**SC.1.N.1.2** **SC.1.N.1.3**	**centimeter(s)** **data** **five senses** **height** **inch(es)** **length** **observation** **odor** **physical property** **record** **temperature** **texture** **time** **volume** **weight** **width**

First Grade Suggested Scope and Sequence			
NGSSS Body of Knowledge: Nature of Science Unit of Study: Technology All Around Us Section 2; Unit 2 in Text			(4 weeks)
Topics	Learning Targets/Skills	Standard(s)	Vocabulary
What Are Inquiry Skills? **How Do We Use Inquiry Skills?** **How Do Scientists Work?**	*Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.* ***Students will:*** • **engage** as scientists using the following inquiry skills: • **observe** three similar objects and record the number of parts you see (e.g., number of flower petals, number of wheels on toy cars, number of sides on shapes). • **estimate and measure** the length of objects found in the classroom using rulers, tape measures, yardsticks (inches) and meter sticks (centimeters). • **estimate and measure** the weight of an object using nonstandard units of measure (e.g., pennies, teddy bear counters, color cubes). • **compare** the weight (heavy/light) of two objects in the classroom using a balance. • **predict** the number of an object that will fit into containers of different sizes and shapes such as beans, marbles, dice, etc. • **sort and classify** a group of objects by the way they move and compare results with others. • **communicate** the look and feel of objects with a partner. • **investigate** by comparing the descriptions of two or more different kinds of matter (e.g., two rocks, two soil types, two animals). • **make** a 2-dimensional and/or 3-dimensional model of an object. • **sequence** an event or a set of picture cards (e.g., someone making a cake).	**SC.1.N.1.4**	**investigate** **model** **natural world** **question** **results** **weight**

	Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations. ***Students will:*** • **generate** a list of questions about the world (e.g., after a nature walk, about a mystery object, after reading a book, before mixing colors). **discuss,** as a class, ways to find answers to the created list of questions. • **investigate** questions in teams through free exploration ○ ” What happens if we…?” ○ “We wonder why…” ○ “If we…, wonder what will happen?” • **provide** appropriate explanations based on those explorations. • **recognize** that answers to questions can be found through investigation. • **apply** new learning that results from the investigation to the real world.	**SC.1.N.1.1 (revisited)**	

Resource Alignment	How Scientists Work	What Are Senses and Other Tools? How Can We Use Our Senses?	What Are Inquiry
HMH Teacher's Edition	Unit 1: Lesson 5 Unit 2: Lessons 1, 2, and 3	Unit 1: Lessons 1 and 2 Unit 2: Lessons 2, 3, and 4	Unit 1: Lessons 3 and 4 Unit 2: Lessons 2 and 4
Hands-on Student Activities and Labs		How Can We Use Our Senses? (Unit 1 Lesson 2) How Can Materials Be Sorted (Unit 2, Lesson 4)	How Do We Use Inquiry Skills? (Unit 1, Lesson 4) How Can We Solve a Problem (Unit 2, Lesson 2)
Daily Essential Questions	How do scientists keep accurate records of investigations?	What are our five senses? What are some properties of objects?	How can we compare observations? How do scientists ask questions? How do scientists make explanations based on observations? How do scientists make use of inquiry skills?
Key Questions	**What is science?** What is the role of a scientist? Use the language in your Nature of Science benchmarks (SC.1.N.1.1 – SC.1.N.1.4) to answer these questions. At the end of the school year, revisit. "**What is a scientist**?" What do your students think know? Student responses may be viewed as classroom assessment for the Nature of Science benchmarks. **Which science process skills are used by primary learners?** observing, measuring, predicting, inferring, investigating, collecting and recording data, comparing, sorting, making models and communicating **What is science?** a way of answering questions by investigating, collecting data and drawing conclusions	**What are sense organs?** body parts (structures) that take in information from the environment **What is a major feature (property)?** any quality or measurement that anyone can make and everyone can agree is the same **What is an observation?** using your senses to describe the things around you by direct observation; seeing, hearing, smelling, tasting or touching things **What is an inference?** An explanation based on prior knowledge or available evidence but NOT direct observation **How do scientists record observations?** as data with pictures or words, and sometimes numbers with units	**What are your data?** the observations you record **What does your data show you?** if your observations support your original prediction (hypothesis) or not **What is an argument?** any position that is supported by observations or data

CPALMS		***Rocks, Rocks, Everywhere*** ***http://www.cpalms.org/Public/PreviewResource Url/Preview/23524*** ***Focused Observation: Recording a Hike*** ***http://www.cpalms.org/Public/PreviewResource Url/Preview/24808*** ***Kool-Aid Chemistry*** ***http://www.cpalms.org/Public/PreviewResource Url/Preview/26692*** ***Taste Vs Smell*** ***http://www.cpalms.org/Public/PreviewResource Url/Preview/20375*** ***Observing and Sorting*** ***http://www.cpalms.org/Public/PreviewResource Upload/Preview/13363*** ***Sorting Solids*** ***http://www.cpalms.org/Public/PreviewResource Upload/Preview/25278*** ***Weighted Eggs*** ***http://www.cpalms.org/Public/PreviewResource Url/Preview/51*** ***Float or Sink*** ***http://www.cpalms.org/Public/PreviewResource Upload/Preview/13369***	***Some Things Happen Fast and Some Things Happen Slow*** *http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13362* ***Focused Observation: Recording a Hike*** *http://www.cpalms.org/Public/PreviewResou rceUrl/Preview/24808* ***Night Journals*** *http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13345* ***Some Things Happen Fast and Some Things Happen Slow*** *http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13362* ***Birds' Bills*** *http://www.cpalms.org/Public/PreviewResou rceUrl/Preview/24802*
Supplemental Literature/ Books	"Spectacles", Ellen Raskin"Seven Blind Mice", Ed Young "Is It Slippery or Sticky?" by Vic Parker, Raintree, 2005 "The Secret Birthday Message", Eric Carle		
Web Resources		Brain Pop Jr.: *Senses* Brain Pop Jr.: *Making Observations* Scholastic Study Jams: *Plants* Best practice in teaching Primary Science https://www.youtube.com/watch?v=mmZTNygI8Qo YouTube: Five Senses https://www.youtube.com/watch?v=Lpev_Raequo	

Teacher Hints	• The first week of school is a perfect time to set up an interactive student notebook or science journal for recording. A science notebook is a compilation of student learning that provides a partial record of the instructional experiences a student has had in the classroom. • Consideration may be given to the use of a class notebook at the start of the school year with the intent of moving toward individual student notebooks sometime within the school year. • Notebooks should be interactive in nature where students are using what is written or and reflecting on the content material. A reflection can be a drawing and labeling an illustration, song, poem, and/or quick-write. • Notebooks allow for students to 'own' their learning. • Teachers can use notebook entries as "evidence" of student learning. Student work can be used in data analysis conversations.	• Making observations and the recording of these observations is the beginning and backbone of all science. • A common misconception that students have is that observation is something you do with your eyes only. Be consistent in reminding them that observation involves use of all the senses, and that the senses may be enhanced by tools. • Tools allow students to make observations that go beyond their senses. Students can investigate tools that enhance or reduce each of the five senses (e.g., hand lens: sight, gloves: touch, stethoscope: hearing, thermometer: temperature). • Observations can be made by comparing things. For example, this lotion smells like flowers, the candy is as hard as a rock, the ball is bigger than a marble. • Standard units of measure (inches) are first introduced in grade 1. However, simple investigations using meter sticks (centimeters) will provide students with early experiences that will set them up for success in grade 2.	

First Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Physical Science
Unit of Study: Matter (3 weeks)

Prerequisite Learning: Kindergarten – SC.K.P.8.1

Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Matter	*Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.* ***Students will:*** • **identify** observable properties of different matter (e.g., apple, toy car, shell, rock). • **record** predictions, observations, and data (written or pictorial) for each sorting activity below using a simple chart or table in a science notebook. o **sort** objects by color using the sense of sight o **sort** objects by shape using the sense of sight or touch o **sort** objects by texture (rough/smooth) using the sense of touch o **sort** objects by size (short/long/tall) using a ruler, tape measure, and yard/meter stick o **sort** objects by weight (heavy/light) using a pan balance o **sort** objects by temperature (hot/cold) using a thermometer o **sort** objects by sink or float • **compare** the sorting methods of other students to their own. • **make** decisions as to how to sort a group of objects based on their observable properties. • **sort** objects by observable properties until each individual object is in its own group. • **ask and answer** "how do you know?" questions of each other following each sort.	**SC.1.P.8.1** Embedded Nature of Science SC.1.N.1.2 SC.1.N.1.3	**color** **float** **height/length/width** o short o long o tall o wide o narrow **matter** **metric ruler** **pan balance** **properties** **ruler** **shape** **sink** **sort (classify)** **temperature** o cold ohot **texture** o rough o smooth **thermometer** **weight**

Resource Alignment	Matter		
HMH Teacher's Edition	TE.185-214 (Unit 5 Lessons 1, 2, and 3)		
HMH Student's Edition	**L.1 SE.185-196**	**L.2 197-200**	**L.3 201-204**
Hands-on Student Activities and Labs	Which Objects Sink or Float? Inquiry Lesson 2 SE. 197-200	How Can We Measure Temperature? Inquiry Lesson 3 SE. 201-204	
Daily Essential Questions	Lesson 1 What Can We Observe About Objects?	Lesson 2 Which Objects Sink or Float?	Lesson 3 How Can We Measure Temperature?

Key Questions	**What is matter? How did you sort your objects? How did your sort compare with another student's sort?** **What are some ways to sort matter?** size, shape, color, texture (grouping by any way they are alike) **How can an object's weight be described?** heavy or light **What happens when an object floats?** it stays on the top of a liquid **What happens when an object sinks?** it falls to the bottom of a liquid **What is matter?** any material (substance) that has mass and takes up space (volume)
Supplemental Literature/Books	"Sadie and the Snowman", Allen Morgan "Who Sank the Boat", Pamela Allen "The Big Balloon Race", Eleanor Coerr Water by Frank Asch, Harcourt, 2000 Altoona Baboona by Janie Bynum, Voyager/Harcourt, 2002 Ducky by Eve Bunting, Clarion/Houghton Mifflin, 1997
CPALMS	*Weighted Eggs http://www.cpalms.org/Public/PreviewResourceUrl/Preview/51* *Sorting Matter http://www.cpalms.org/Public/PreviewResourceLesson/Preview/9298* *Shell Sorts http://www.cpalms.org/Public/PreviewResourceLesson/Preview/15999*
Web Resources	Brain Pop Jr.: *Solids, Liquids, and Gases* *Grouping and Changing Materials* *Discovery Education-Matter K-2 resources*
Teacher Hints	• Create a "junk box" (e.g., paper clips, pattern blocks, rubber bands, cotton balls, toy cars, ping pong balls, erasers, pencils, pens, paper, notecard, buttons, marbles, and plastic fork/spoon/knife) that can be used during the sorting activities for this unit. • After students have completed one sort using the "junk box" (their own way), ask them to sort the same objects repeatedly using a different property. • Sorting by color, shape, and size comes most naturally to young children. Students should be given time to sort and re-sort to explore the other observable properties of matter including texture, odor, and sink/float. • When making observations, observable properties of matter are discovered. We want for our students to go beyond using their five senses in identifying properties of matter by including the measurement tools scientists use such as a thermometer, balance, measuring cup, beaker, ruler, and tape measure. Measurement is the process of making comparisons between what is being measured and a standard. Measurements can be recorded in standard units for length (inches and centimeters) and non-standard units for weight (e.g., paper clips, pennies, cubes). • Students are not responsible for being able to measure temperature by reading a thermometer. Students only need a conceptual understanding of how a thermometer works (the higher the red liquid, the hotter the temperature; the lower the red liquid, the cooler the temperature). • Developing comparison strategies is a life-long skill. Deeper level thinking is involved when asking students to find a similarity shared by two very unlike objects.
Miscellaneous	Create a Foldable that identifies the Properties of Matter (texture, color, size, weight, temperature, sink/float) Properties of Solids Chart Big and Small Sort; Hot and Cold Sort

First Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Physical Science
Unit of Study: Motion (6 weeks)

Prerequisite Learning: Kindergarten – SC.K.E.5.1, SC.K.P.10.1, SC.K.P.12.1, SC.K.P.13.1

Topics	Learning Targets/Skills	Standard(s)	Vocabulary
How Do Objects Move?	*Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.* ***Students will:*** • **observe and describe** the various ways that objects move (e.g., fast, slow, fall, slither, tumble, fly, climb, roll, slide, sway). • **demonstrate and describe** the following movements of objects: straight line, zigzag, back-and-forth, round-and- round, forward and backward. • **describe** the force needed for objects to move in each of the different ways. • **investigate** the speed (faster/slower) of different objects rolling down a ramp. • **explore** why different objects move at different speeds (type and texture of surface and wheels, mass of car). • **record** (written or pictorial) observations, predictions, data, and results that occurred during movement investigations in a science notebook.	**SC.1.P.12.1** Embedded Nature of Science SC.1.N.1.1 SC.1.N.1.3	**direction** **force motion** o back and forth o forward and backward o round and round o straight line o zigzag o slow o fast **move/movement** **position** **pull** **push** **speed**

Changes in Motion	*Demonstrate that the way to change the motion of an object is by applying a push or a pull.* ***Students will:*** • ***review*** *that a force can be a push or a pull that may cause movement or cause an object to change its position.* • ***demonstrate*** *push and pull on an object.* • ***explore*** *force as a push or pull on an object.* • ***describe*** *an object's position (e.g., in, out, up, down, left, right, over, under, on, off).* • ***demonstrate and describe*** *how to change the position of an object (push or pull).* • ***predict and record*** *how to change the direction of an object already in motion (push or pull).*	**SC.1.P.13.1** Embedded Nature of Science SC.1.N.1.3	**change**

Resource Alignment	**Motion**	**Changes in Motion**
HMH Teacher's Edition	TE. 217-254	TE. 229-254
HMH Student Edition	Lesson 1 217-224 Lesson 2 225-228	Lesson 3 229-240 Lesson 4 241-254
Hands-on Student Activities and Labs	Guided Inquiry L2. How Can We Move a Ball?	
Daily Essential Questions	L1 How Do Objects Move? L. 2 How Can We Move a Ball?	L3 How Can We Change the Way Objects Move? L4 How Can We Change Motion?
Key Questions	**What is a force?** **How would you compare/contrast a push and a pull?** **How do you describe an object's position?** **How do you change and object's position?** **What are some different types of motion?** straight path, zigza circular, curved, up and down, and back and forth	**What can change an objects motion?** a force can speed up, slow down or change the direction of an object **What is a force?** force is a push or pull **What is motion?** the change in the position of an object caused when a force is applied
CPALMS	*Making Objects Move Science NetLinks* http://www.cpalms.org/Public/PreviewResourceUrl/Preview/1957 *Investigating Motion with Marbles* *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/2486*	*Friction in Our Lives* *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/23102* *Making Objects Move* *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/1957*
Web Resources	Scholastic Study Jams: *Newton's First Law - Inertia* Scholastic Study Jams: *Force & Motion* Brain Pop Jr.: *Pushes and Pulls*	

Supplemental Literature	Scott Foresman readers: *Movement and Sound* Scott Foresman readers: *Forces and Sounds* "Choo Choo", Virginia Lee Burton Show Us Your Wings by Susan Ring, Yellow Umbrella, 2004 Bear on a Bike by Stella Blackstone, Barefoot Books, 2007 Motion by Rebecca Olien, Capstone, 2005 "Mr. Grumpy's Motorcar", John Burningham Show Us Your Wings by Susan Ring, Yellow Umbrella, 2004 Bear on a Bike by Stella Blackstone, Barefoot Books, 2007Motion	
Teacher Hints	• A force is a push or a pull that may cause an object to move or change direction. Magnets, wind, water, pushes, pulls, and gravity can be used to demonstrate the effects of a push or pull on an object. • Provide exposure to contact and non-contact forces that may result in motion. Students do not need to know the terms contact forces (touching) and non-contact forces (blowing, magnetism, gravity) but are good descriptors of kinds of forces. • Students should be very comfortable with the idea that if motion has occurred, then a push or pull has been applied. • Note: Not all pushes or pulls result in motion. When a person applies a push to the wall of a brick building; the building does not move. • Students need to become comfortable observing, describing, and discussing how things move (e.g., animals, including themselves, and inanimate objects). • Along with observing, describing, and discussing motion of objects, students should be able to draw the path that results from the motion of an object (straight line, back and forth, forward and backward, round and round, and zigzag). • Observation of motion naturally leads to measuring how far, how fast, and for how long. Standard units (inches and centimeters) are used to determine linear measurements are used at this grade level. It would be appropriate to explore the use of stopwatches as well. • Students should be given opportunities to estimate • /predict) prior to measuring a variety of objects. Using the strategy of benchmarking amounts, their estimation skills will improve.	• Magnets, wind, water, pushes, pulls, and gravity can be used to change the original position of an object and/or change the direction of an object already in motion. • Gravity can act on an object to change its original position. For example, landslides are caused by gravity. Another example would be for students to observe a marble or car rolling down a track or ramp. • Experimenting with the relationship between applied force on an object and the distance the object moves will benefit the development of this concept in later years.

Miscellaneous	Use the Mouse Trap Board game and Marble Race Construction Sets to have students identify push, pull, changes in direction, and experiment with gravity. Marshmallow Launcher Activity Push & Pull Sorting Mat Push & Pull Formative Assessment	Motion Maze

First Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Earth/Space Science
Unit of Study: Objects in the Sky (5 weeks)

Prerequisite Learning: Kindergarten – SC.K.N.1.2, SC.K.E.5.1, SC.K.E.5.5, SC.K.E.5.6, SC.K.P.8.1, SC.K.P.13.1

Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Stars, Sun, and Gravity	*Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.* *Investigate how magnifiers make things appear bigger and help people see things they could not see without them.* ***Students will:*** • **review** objects that are sometimes visible in the day sky (e.g., sun, sometimes moon, clouds) and night sky (e.g., stars, clouds, moon). • **review** that the sun is a star that appears larger than the other stars. • **review** that the other stars appear tiny because they are farther away. • **observe and discuss** that there are more stars in the sky than anyone can easily count and that stars are not scattered evenly in the sky. • **investigate** how hand lenses and microscopes (and other tools like binoculars and telescopes) make things appear closer, bigger, and more detailed. • **record** observations of the investigations using a hand lens in a science notebook (e.g., details on a penny, cereal, rocks, leaves). • **discuss** the importance of using magnifiers to view objects.	**SC.1.E.5.1** **SC.1.E.5.3** Embedded Nature of Science SC.1.N.1.1 SC.1.N.1.2 SC.1.N.1.3	**beneficial** **clouds** **day** **sky** **detail** **distance** **Earth** **hand lens** **harmful** **helpful light** **magnify** **microscope** **model** **moon** **night sky** **stars sun**
	Identify the beneficial and harmful properties of the sun. ***Students will:*** • **identify and describe** beneficial properties of the sun (e.g., light, warmth, energy for living things, solar energy). • **identify and describe** harmful properties of the sun (e.g., sunburn, melting, fading, dehydration). • **compare** the beneficial and harmful properties of the sun (e.g., using charts, Thinking Maps®, graphic organizers). • **apply** knowledge of harmful properties of the sun to protect human body structures (sun screen, umbrella, hat, sunglasses).	**SC.1.E.5.4** Embedded Nature of Science SC.1.N.1.3	

Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Stars, Sun, and Gravity	*Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object.* ***Students will:*** • **review** that a force is a push or pull on an object. • **demonstrate** how the Earth's gravity pulls an object toward the ground (attraction) unless something holds it up. • **explain** that gravity acts on all objects on Earth even though it does not touch the objects (a non-contact force).	**SC.1.E.5.2** Embedded Nature of Science SC.1.N.1.1 SC.1.N.1.2 SC.1.N.1.3	**attract** **Earth** **Force** **Gravity** **Pull** **push**

Resource Alignment	**Stars, Sun, and Gravity**
HMH Teacher's Edition	Unit 3 Page 89 A
Student's Edition	Pg 89-134
Hands-on Student Activities and Labs	Gravity Painting: Fill a balloon with paint and drop it from a chair onto bulletin board paper. Make Constellations on black paper with white crayons. See "Student Resources" for Virtual Lab activities Follow the link to create your own Planetarium in your classroom https://www.youtube.com/watch?v=JqHa3tpkQI0
Daily Essential Questions	**What is the force that pulls you down?** **What is gravity?** **What happens to objects when they are dropped?** **What are stars?** **What is the purpose of a magnifier?** **How is the sun good and harmful to us?**
Key Questions	**What do you find in the sky?** **What does the sun do?** **What is a star?** a huge object in space made of gas that gives off light and heat **What is the sun?** a star; the closest star to Earth **What is gravity?** force that pulls objects toward the Earth **What is a lens?** a curved piece of glass that makes objects viewed through it appear to be larger **How does a telescope work?** light telescopes capture light using lenses and mirrors to make distant objects appear larger **What are some benefits of the sun?** lights and heats the Earth; causes the weather on Earth; provides the energy for life through the food chain. (The sun's light reflects off the moon causing the phases of the moon.) **What are some harmful effects of the sun?** too much sun can cause droughts, severe weather and raise temperatures harming living things; too much sun causes sunburn and sun poisoning for humans

CPALMS	*Magnification* *http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13331* *Properties of the Sun* *http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13347*

Web Resources	Brain Pop Jr.: *Sun* NASA PBS Learning - *Sun* Brain Pop Jr.: Gravity PBS Learning – *Gravity*
Supplemental Literature	Scott Foresman readers: *Day and Night Sky* "The Sun" & "The Groundhog's Shadow" *The Sky* *The Sun* "Shadows", Blaise Cendrars The Sun Is My Favorite Star by Frank Asch, Voyager/Harcourt, 2008
Teacher Hints	• While there are billions of trillions of stars in the universe, we can only see about 2,000 with the naked eye. The sun is a star we can easily see with the naked eye because it is the closest star to Earth. Students naturally build a misconception regarding the sun as a star and its apparent size. Because the sun is the closest star to us, it takes on the appearance of being the largest star in the sky. • Students are not responsible for recognizing that the sun is a medium-sized star. This is a concept that is specifically taught in Grade 3. However, page 46 in the student consumable will provide an early introduction of this concept. • While reviewing objects found in the day and night sky, students can use their bodies to model how Earth rotates around the sun while the sun remains stationary. This will help the students understand why the sun cannot be seen in the night sky (when their own back is to the sun model). Earth's rotation gives us an alternating pattern of day and night. Create both 2- and 3-dimensional models as a review of the day and night sky. • Students at this age are able to observe and discuss objects in the night sky but have not developed the ability to understand how many stars are really in the sky. Stars are in the daytime sky too! • Explore the effect of the sun's radiant light on our bodies. One resource to use is UV Beads. The students string a few UV beads onto a pipe cleaner and wear it as a bracelet. Allow for the students to discover what can happen to these beads in the sunlight and when exposed to the UV rays. Allow the discussion to lead toward sun protection, Sun screen, clothes, etc. Extend the activity to talk about medicines stored in colored medicine bottles. These bottles are to protect the medicine from the UV rays. To prove this point, place some UV beads in the medicine bottles (usually brown and blue bottles are what are available from the pharmacy) and place these bottles outside. If they are truly UV bottles, the beads inside will remain white. • Gravity is a force that is pulling objects to the ground if not held up. Explore gravity by dropping things, observing pendulums, and observing objects falling on their own. First grade instruction on gravity is foundational to future understandings of this concept. In grade 3, students explore examples of ways gravity can be overcome such as leaves on a tree, throwing a ball in the air, a frog jumping, and paper sitting on a table. • Here is a common student misconception: When objects are dropped onto a table, students often think that the table has gravity. The table is simply something that holds up objects (no different than their hands. • Investigate how hand lenses and microscopes (and other tools like binoculars) make things appear closer, bigger, and more detailed. This concept links to telescopes instructed in Grade 3.
Miscellaneous	Organize a Family Night at school to observe the night sky Make a mobile that represents the day and night sky Moon Phases with Oreos Moon Phases Calendar Day and Night Sky Venn Diagram

First Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Earth/Space Science
Unit of Study: Earth's Resources (5 weeks)

Prerequisite Learning: Kindergarten – SC.K.P.8.1

Topics	Learning Targets/Skills	Standard(s)	Vocabulary

Earth's Resources	*Recognize that water, rocks, soil, and living organisms are found on Earth's surface.*
	Students will:
	• **record** observations of Earth's surface in a science notebook while walking around the school campus.
	• **sort and classify** things collected from Earth's surface during the walk around the school into categories of their own choosing.
	• **discuss and compare**, with a partner, the collections of things gathered during the walk around the school campus.
	• **distinguish** between what is naturally found on Earth's surface and what is man-made.
	• **identify** *natural resources* found on Earth's surface.
	  o non-living – water, rocks, soil
	  o living organisms – animals and plants
	• **identify and label** the things collected during the walk that are considered natural resources.
	• **name** places water is found on Earth's surface (e.g., rivers, lakes, ponds, ocean).
		SC.1.E.6.1
		Embedded Nature of Science SC.1.N.1.1
		SC.1.N.1.2
		SC.1.N.1.3
		SC.1.N.1.4
			animals
			Earth
			erosion
			fast change
			lake
			natural resources
			need
			ocean
			organisms
			plants
			pond
			river
			rocks
			safety
			slow change
			soil
			water
			weathering

	Describe the need for water and how to be safe around water. ***Students will:*** • **describe** the need for water (plants and animals including humans). • **recognize** that many organisms live in water. • **describe** ways to be safe around water (Review Teacher Hints.).	**SC.1.E.6.2**	
	Recognize that some things in the world around us happen fast and some happen slowly. ***Students will:*** • **list** ways Earth's surface can change (e.g., beach dunes, cracked sidewalks, hole in the ground). • **explore** the school campus for signs of change that have occurred. • **discuss** the findings from the exploration of the school campus. • **record** evidence of changes to Earth's surface in a science notebook.	**SC.1.E.6.3** Embedded Nature of Science SC.1.N.1.1 SC.1.N.1.2	

Earth's Resources (cont.)	• **identify** this evidence of change to Earth's surface as fast or slow (e.g., a tree falling is a fast change and a hole forming on the surface may be a slowchange). • **discuss** natural processes that change the Earth's surface quickly (e.g., floods, hurricanes, tornadoes, earthquakes, volcanoes, fires, tsunamis). • **investigate** ways that Earth's surface changes quickly (e.g., model effects of water and wind erosion using a sand box and spray bottle on a stream setting; sand box and fan on high speed). • **record** observations from the investigations of changes to the Earth that occur quickly. • **discuss** natural processes that change the Earth's surface slowly (e.g., wind, water, drought, tides). • **investigate** ways that Earth's surface changes slowly over time (e.g., model effects of water and wind erosion using sand box and spray bottle on mist; sandbox and fan on low speed). • **record** observations from the investigations of changes to the Earth that occur slowly. • **predict** the changes that may occur to Earth's surface after certain weather conditions (e.g., light rain, a thunderstorm, strong winds, hot and dry).		

Resource Alignment	Earth's Resources
HMH Teacher's Edition	Unit 4 135A-182
HMH Student Edition	Unit 134-182
Hands-on Student Activities and Labs	Recycle Read Aloud: The Lorax by Dr. Seuss Discuss How trees grow See "Student resources" for Virtual Lab Make Paper Experiment: http://www.pbs.org/parents/crafts-for-kids/homemade-paper/
Daily Essential Questions	**What is a resource?** **Where do we get our resources?** **What are some components of Earth's surface?** **What do water, soil, rocks, and living things have in common?** **Why is water necessary?** **What are some changes that happen on Earth's surface?**
Key Questions	**What can we find on Earth?** **What changes Earth?** **What are some examples of natural resources?** land (soil, rocks and minerals), water, air, plants and animals **Why is water important?** all living things need water to survive **What is pollution?** anything (change) in the environment that can harm living things or damage natural resources **How can water become a problem (unsafe)?** when we get too much too fast (flood), too little (drought) or it is too dirty (polluted) to use
CPALMS	**Your Own Backyard:** *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/4* **Bobber the Water Safety Dog: Life Jackets** *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/9974* **Water Has Many Uses** *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/9* **Water is Important** *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/18073* **Tree Observations** *http://www.cpalms.org/Public/PreviewResourceUpload/Previ* **Some Things Happen Fast and Some Things Happen Slow** *http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13362*
Web Resources	Brain Pop Jr.: *Fast Land Changes* Brain Pop Jr.: *Slow Land Changes* Brain Pop Jr.: Soil Brain Pop Jr.: Rocks and Minerals *Bobber*

Supplemental Literature	*Natural Resources; Land, Air, and Water; Places in the World* "Everybody Needs a Rock", Byrd Baylor "Simon Underground", Joanna Ryder "The Very Last First Time", Jan Andrews Let's Look at Rocks by Jeri Cipriano, Yellow Umbrella, 2004 "Keep the Lights Burning, Abbie", Peter & Connie Roop "The Magic School Bus at the Waterworks", Joanna Cole Rain by Manya Stojic, Dragonfly, 2009 Hill of Fire", Thomas Lewis
Teacher Hints	• Earth's surface is made up of land and water. There is even land under Earth's oceans. The land on Earth is made of rocks, soil, and sand, although all land originates from rock. Through the processes of weathering and erosion, the landforms can look very different (e.g., mountains, farmlands, deserts, wetlands). • Three-fourths of the land is covered by water in the form of oceans, lakes, ponds, rivers, streams, etc. • Life exists both on land and in water. Living things are called organisms and are considered natural resources. • When sorting and classifying resources found on Earth's surface, it is important that students are given an opportunity to "discover" the classification of man-made resources versus natural resources. • Water is necessary for life on Earth, and without it, we could not survive. Besides sustaining life, water is used in many other ways (e.g., transporting people and goods, engaging in water sports and other recreational activities, irrigating, powering hydroelectric plants and steam engines, cooking, cleaning). • Water safety may include but is not limited to the following: learning how to swim, following posted signs near bodies of water, entering the water feet first, avoiding swimming during bad weather. • Effects of a changing surface can be easily observed around the school and neighborhood. Look for evidence of weathering (the breaking down of rock) and erosion (the movement of rock to a new location). Evidence of these processes might be a sand dune forming, rocks with cracks, holes in the ground, rocks and soil at the bottom of a hill, impressions left from water flowing over the surface, and wind containing sand particles. Because time is a major factor, it is difficult for young children to fully understand that the Earth's surface is constantly changing. • A painter's tray offers a good way to show erosion (fast and slow change) by dripping and pouring water over a sand and soil mix that has been placed on the sloping part of the tray. Water then collects in a reservoir which can be a garbage can or other container. • Students are not responsible for the terms weathering and erosion but should be comfortable describing observations of these processes when modeled through investigations.
Miscellaneous	Create a Foldable - "Layered Look" to illustrate the elements of the Earth's surface (mountain, valley, plains, grasslands, ocean, etc) and for places water is found on Earth (rivers, lakes, oceans, streams).

First Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Life Science
Unit of Study: Living Things (3 weeks)

Prerequisite Learning: Kindergarten – SC.K.L.14.3

Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Living and Nonliving Things	*Differentiate between living and nonliving things.* *Make observations of living things and their environment using the five senses.* ***Students will:*** • **record** observations of different things on the school campus in a science notebook. • **develop**, as a class, a definition to determine if an organism is living (e.g., can grow, change, have babies, need food, move on their own). • **apply** their class definition for living things to sort the school campus list into "living". • **evaluate** the other group for things that are dead or once living (e.g., a stick or leaf lying on the ground, a dead insect, a snake's skin that has been shed). • **develop**, as a class, a definition to determine if an object from the list is non-living. • **identify** the characteristics of living (to include dead things) and nonliving things. • **explain** the differences between living and nonliving things. • **apply** the characteristics of living things to include those that were once alive or dead. • **describe** each living thing as an organism that lives in its own environment. • **record** observations of different living organisms (dead or alive) found in their environment using the five senses. • **ask and answer** "how do you know?" questions that apply to living and nonliving things. *Make observations of living things and their environment using the five senses.* ***Students will:*** • **apply** the class definition of living things to evaluate known living things (e.g., tree, dog, people) and things that were once alive (e.g., dead plant, stick, egg shell). • **ask and answer** "how do you know?" questions that apply to living things.	**SC.1.L.14.3** **SC.1.L.14.1** Embedded Nature of Science SC.1.N.1.2 SC.1.N.1.3 SC.1.N.1.4 **SC.1.L.14.1** Embedded Nature of Science SC.1.N.1.2 SC.1.N.1.3 SC.1.N.1.4	**alive** **dead** **define** **definition** **environment** **living** **nonliving** **organism** **reproduce**

Plants	*Identify the major parts of plants, including stem, roots, leaves, and flowers.* ***Students will:*** • **observe** plants using a hand lens. • **record** observations of plants and their parts in a science notebook. • **identify** the major parts of plants (stem, roots, leaves and flowers, seed). • **compare** the same parts of two different plants (e.g., grass and marigolds). • **explain** that plants of the same kind will have the same kind of stem, roots, leaves, flowers, and seeds	**SC.1.L.14.2** Embedded Nature of Science SC.1.N.1.2 SC.1.N.1.3	**flower** **leaf** **plant** **root** **seed** **stem**
Plant Enrichment	***Students will:*** • **observe and record** the growing process of plants that began to grow from earlier. • **observe** different varieties of plants (e.g., fern, trees, shrubs, grass, petunias).		

Resource Alignment	**Living Things**	**Plants**
HMH Teacher's Edition	Unit 7 Page 258-263	
HMH Student's Edition	Page 258-263	
Hands-on Student Activities and Labs	Page 255D- 255H Take them on a sidewalk field trip and search for living and nonliving things.	
Daily Questions	**What are living and nonliving things?** **What is the difference between living and nonliving?** **Can you name 5 things that are living?** **Can you name 5 things that are nonliving?** **How do we use our five senses to observe?** **What are the major parts of a plant?** **What are some characteristics of living things?** **What are some characteristics of nonliving things?**	**What are the basic parts of plants?** **Compare and contrast two different plants using a Venn diagram.**
Key Questions	**What do all living things need to survive and Why?** **What observations mean something is living?** if it needs food, water, air and shelter. If it grows or changes over time. If it can adapt to its surroundings to survive **What do all plants need to survive?** sunlight, water, air (carbon dioxide), and nutrients	

	What are the major parts (structures) of most plants and what do they do (function) to keep the plant alive? roots hold plants in the soil and take in water and nutrients. Stems hold up the plant and carry food and water through the plant. Leaves take in light and carbon dioxide to make food for the plant; flowers make fruit; fruits hold seeds and new plants grow from seeds **What is an organism?** a living thing **What does it mean if something is non-living?** it does not need food, water, air or shelter. It does not need to adapt to its surroundings to survive
CPALMS	*Living and Nonliving Things* *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/50790* *Sharing What We Know About Organisms* *http://www.cpalms.org/Public/PreviewResourceUpload/Preview/25302* *Exploring Plants* *http://www.cpalms.org/Public/PreviewResourceUrl/Preview/5148* *Flower Power Flower Company – MEA and STEAM Activity* *http://www.cpalms.org/Public/PreviewResourceLesson/Preview/32331*
Web Resources	https://www.youtube.com/watch?v=p51FiPO2_kQ Discovery Education-Magic School Bus- Goes to Seed and Gets Planted.
Supplemental Literature	Scott Foresman readers: *Is it a Living Thing? Living and Nonliving* "Swimmy" & "It's Mine", Leo Lionni "Chipmunk Song", Joanne A Tree is Nice", Janice Udry"The Tiny Seed", Eric Carle Macmillan Leveled Reader, "Deer Watching" & "See the Birds ""Mousekin's Birth", Edna Miller Here Is the African Savanna by Madeleine Dunphy, Web of Life, 2006
Teacher Hints	• The concept of living and nonliving things is not an easy one for young children. They naturally want to classify dead plants and dead animals as nonliving. Instruction will move them away from this idea. Living things are those that are currently alive or were once alive (e.g., bugs, fallen leaves, bobcats, trees). • When beginning this instruction, keep the examples clear cut – plants (including plant parts like the flower) and animals that are no longer alive. They will quickly have questions about a wooden bat, a hamburger, their teeth, etc. Starting off instruction with these things will hinder learning. • **Nonliving things have NEVER been alive** (e.g., air, rocks, water, metal, glass). They do not have any needs. Design pet rocks for each student to "care for" to help with this understanding. • Ultimately as they work on their class definition, the goal • Investigations of what happens when a basic need is not met must be done with plants, and not animals, for obvious reasons. However, discussion should take place regarding what happens when basic needs of animals (including humans) are not met. • A major misconception is created when seeds are hung in a window to germinate. This misleads students to thinking that seeds need light to germinate which they do not. Seeds need moisture and warmth to begin the process of germination. • Roots come in all shapes and sizes. Expose students to taproots (carrots) and fibrous roots (grass). Terminology of taproot and fibrous is not required. • Stems come in all shapes and sizes. Expose students to soft, green stems, like those associated with a marigold, as well as hard, thick stems, like those associated with bushes and trees.

	is to realize that all living things need (or needed at one time) air, water, food (a source of energy), a place to live, and the ability to reproduce. • Consider making a chart (pictorial or written) of examples of living and nonliving things that are not so easily defined. Seek out the thoughts of your peers on some of the tougher ideas that come forward in your classroom. • All living things eventually die. Be prepared for this to come up. • Consider comparing the following: video of a real baby to a baby doll, a real dog to a stuffed dog, a real worm to a gummy worm. • Make a leaf rubbing of both a real leaf and of a brown leaf on the ground. Make a comparison.	• Leaves come in all shapes and sizes. This will be an easy concept to explore. Caution students about NOT picking a leaf from the same bush or tree because of the importance of leaves in the making of energy for plant growth. Pine needles are the leaves of pine cone trees. • Seeds are fun to explore. The size of a seed does not indicate the size of the parent plant. Investigate this! • We eat stems (celery, broccoli, asparagus, sugar cane, potatoes), leaves (lettuce, parsley, kale, cabbage, spinach, mustard greens), roots (carrots, radish, turnip, potato, onion), flowers (violets, honeysuckle, broccoli, cauliflower, clover), and seeds (sunflowers, peanuts, lima beans, peas, corn).

First Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Life Science
Unit of Study: Living Things & Their Parents (2 weeks)

Prerequisite Learning: Kindergarten – none

Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Living Things and Their Parents	*Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population.* ***Students will:*** • **pair** plant and animal parents with their offspring by looking at their physical traits. • **recognize** that offspring (both plants and animals) are related to their parents. • **explain** how they know which offspring belongs to which parent. • **describe** differences that exist between parents and offspring within a population of plants and animals.	**SC.1.L.16.1** Embedded Nature of Science SC.1.N.1.4	**animals** **humans** **offspring** **parent** **plants** **population** **related** **traits**
Animal Enrichment	***Students will:*** • **discuss** ways to group animals (e.g., how they move, what they eat, where they live, size). • **sort** animals into six major groups (mammals, birds, reptiles, amphibians, fish, and insects). • **explain** how they know animals fit in a certain group.	(Preview of learning/skills to be acquired in later grades)	**Amphibians** **Animals** **birds** **fish** **insects** **mammals** **reptiles**

Resource Alignment	Parent and Offspring	Animal Enrichment
HMH Teacher's Edition	Unit 8 Page 294-297 Page 268-273	
HMH Student's Edition	Page 294-297 Page 268-273	
Daily Questions	**How are parents and offspring similar?**	
Key Questions	**How are parent organisms like their young?** the young look like (similar to) their parent but not just like them **What is variation?** when something is similar to but not the same as the original **What is a population?** all the organisms of the same kind (species) that live in the same place at the same time	
CPALMS	*Tracking Growth and Comparing Offspring* *Changing Cicada Catching a Balance Diet* *Using My Senses*	*What am I? Classifying Living Things*
Web Resources	*Decorah Eagles* Brain Pop Jr.: *Plant Life Cycle Life Cycles*	*Birds and Mammals Worksheet*
Supplemental Literature	Scott Foresman readers: *Egg to Owl* *Many Lea*	

	v *e* *s* *Living Things Grow and Change* "My Mother is Mine by Marion Dane Bauer, Simon & Schuster, 2004 Does a Kangaroo Have a Mother, Too? by Eric Carle, HarperCollins, 2005 Giant Pandas by Michelle Levine, Lerner, 2006	
Teacher Hints	• Plants and animals will closely resemble their parents. This is because of heredity. Marigold plants will produce seeds that will germinate and then grow into marigold plants. Squirrels will give live birth to other squirrels. Heredity is the 'messages' or 'coding' we inherit from our parents. We know these to be genes that are passed from parent to offspring. Heredity in humans determines traits as common as eye color, hair color, and shape of facial features to susceptibility of disease. • An easy way for children of this age to begin learning about heredity is to discuss how offspring often resemble their parents. Because heredity is genetically determined, there tends to be many observable similarities between parents and their offspring. Terminology of heredity is not required. • Children should be exposed to offspring that do not look like their parents (e.g., mealworm-beetle, caterpillar-butterfly). • Water is the most important substance to life on Earth. No organism can exist without water. • Plants make their own food. Animals, including humans, eat plants and/or other animals for food. • Basic needs must be met for an organism to survive.	Begin a discussion of animal classification by giving each group of students a bag of animals to sort. For the first several rounds of sorts, allow the students to sort the animals according to a physical attribute of their own choosing: land versus water, fur versus no fur, legs versus no legs. After each round, have students walk around to the different groups and determine how each of the groups sorted their animals. Explain to the students that scientists have grouped animals according to an attribute common to all members of a group. ○ mammals – produce milk for their young ○ birds – have feathers ○ reptiles – have scales and leathery skin ○ amphibians – begin their lives in the water (have gills) and then live on land (have lungs) ○ fish – have gills their whole life ○ Although each of the six groups of animals is associated with specific attributes common to all species, not all the members of a specific group are guaranteed to share a attribute or behavior. The duck-bill platypus and echidna found in Australia and New Guinea are examples of this.

First Grade Suggested Scope and Sequence

NGSSS Body of Knowledge: Life Science — April 27 – May 8
Unit of Study: Plant & Animal Needs — (2 weeks)

Prerequisite Learning: Kindergarten – none

Topics	Learning Targets/Skills	Standard(s)	Vocabulary
Plant & Animal's Basic Needs	*Through observation, recognize that all plants and animals, including humans, need the necessities of air, water, food, and space.* ***Students will:*** • **identify** the basic needs of all living things, including humans (air, water, food, space, and shelter). • **compare** the needs of animals to plants to see the similarities in all living things. • **investigate** what happens when one of the basic needs for plant growth is not present (e.g., plant without air, plant without water, plant without sunlight, plant without space, plant without shelter). • **describe** how animals respond when a basic need is not present (e.g., may become thirsty when needing water, finds a new shelter when a home is destroyed, looks for new space when overcrowded). • **explore** the process of growing various types of plants from seeds focusing on basic needs. • **ask and answer** "how do you know" questions regarding the results of basic needs investigations.	**SC.1.L.17.1** Embedded Nature of Science SC.1.N.1.1 SC.1.N.1.4	**Air** **animals** **food** **needs** **plants** **shelter** **space** **survival** **water**

Resource Alignment	Plant & Animal's Basic Needs
HMH Teacher's Edition	Unit 9 Page 338-341 Page 354-359
HMH Student's Edition	Page 338-341 Page 354-359
Hands-on Student Activities and Labs	Page 335F
Daily Questions	**What do plants/animals need to survive?** **How do wild animals meet their needs?** **How do domestic animals meet their needs?** **What are the basic needs of plants?** **What are the basic needs of animals?**

Key Questions	**What happens when a basic need for plants/animals is not present?** **What do animals need to survive?** food, water, oxygen, shelter and space **What do plants need to survive?** sunlight, carbon dioxide, water and nutrients
CPALMS	Friendly Aquarium http://www.cpalms.org/Public/PreviewResourceLesson/Preview/47124 How Does Your Garden Grow? http://www.cpalms.org/Public/PreviewResourceUrl/Preview/23888 Microhabitats http://www.cpalms.org/Public/PreviewResourceUpload/Preview/13387
Web Resources	https://www.youtube.com/watch?v=k4UDf3tF_O4 https://www.youtube.com/watch?v=dUBIQ1fTRzI YouTube: Needs of Animals PBS: Needs of Living Things YouTube: Needs of Living Things
Supplemental Literature	"Make Way for Ducklings", Robert McCloskey "The Very Busy Spider", Patricia Lauber & Holly Keller Growing Vegetable Soup by Lois Ehlert, Harcourt, 1987 Living and Nonliving by Carol K. Lindeen, Capstone, 2008 What's This? by Caroline Mockford, Barefoot Books, 2007
Teacher Hints	• Investigations of what happens when a basic need is not met must be done with plants, and not animals, for obvious reasons. However, discussion should take place regarding what happens when basic needs of animals (including humans) are not met. • A major misconception is created when seeds are hung in a window to germinate. This misleads students to thinking that seeds need light to germinate which they do not. Seeds need moisture and warmth to begin the process of germination.


Resources:
Just for YOU!

Science Process Skills: Basic and Integrated

Observing: using your senses to gather information about an object or event; a description of what is perceived; information that is qualitative data

Measuring: using standard measures or estimations to describe specific dimensions of an object or event; information considered to be quantitative data

Inferring: formulating assumptions or possible explanations based upon observations

Classifying: grouping or ordering objects or events into categories based upon characteristics or defined criteria

Predicting: guessing the most likely outcome of a future event based upon a pattern of evidence

Communicating: using words, symbols, or graphics to describe an object, action, or event

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Formulating Hypotheses: stating the proposed solutions or expected outcomes for experiments; proposed solutions to a problem must be testable

Identifying Variables: stating the changeable factors that can affect an experiment; important to change only the variable being tested and keep the rest constant

Defining Variables: explaining how to measure a variable in an experiment

Designing Investigations: designing an experiment by identifying materials and describing appropriate steps in a procedure to test a hypothesis

Experimenting: carrying out an experiment by carefully following directions of the procedure so the results can be verified by repeating the procedure several times

Acquiring Data: collecting qualitative and quantitative data as observations and measurements

Organizing Data: making data tables and graphs for data collected

Analyzing Investigations: interpreting data, identifying errors, evaluating the hypothesis, formulating conclusions, and recommending further testing when necessary

LOW COMPLEXITY Level 1 (Recall)	MODERATE COMPLEXITY Level 2 (Basic Application of Concepts and Skills)	HIGH COMPLEXITY Level 3 (Strategic Thinking & Complex Reasoning)	HIGH COMPLEXITY Level 4 (Extended Thinking & Complex Reasoning)
This level is the recall of information such as a fact, definition, or term, as well as performing a simple science process or procedure. Level 1 only requires students to demonstrate a rote response; use a well-known formula; follow a set, well-defined procedure (like a recipe); or perform a clearly defined series of steps. **Some examples are:** • Recall or recognize a fact, term, or property. • Represent in words or diagrams a scientific concept or relationship. • Provide or recognize a standard scientific representation for simple phenomena. • Perform a routine procedure, such as measuring length. • Identify familiar forces (e.g., pushes, pulls, gravitation, friction, etc.). • Identify objects and materials as solids, liquids, and gases.	This level includes the engagement of some mental processing beyond recalling or reproducing a response. The content knowledge or process involved is more complex than in Level 1. Level 2 requires that students make some decisions as to how to approach the question or problem. Level 2 activities include making observations, and collecting data; classifying, organizing, and comparing data; and representing and displaying data in tables, graphs, and charts. **Some examples are:** • Specify and explain the relationships among facts, terms, properties, and variables. • Identify variables, including controls, in simple experiments. • Distinguish between experiments and systematic observations. • Describe and explain examples and non-examples of science concepts. • Select a procedure according to specified criteria, and perform it. • Formulate a routine problem given data and conditions. • Organize and represent data.	This level requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands at Level 3 are complex and abstract because the multi-step task requires more demanding reasoning than Level 2. Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve non-routine problems. **Some examples are:** • Identify research questions and design investigations for a scientific problem. • Design and execute an experiment or systematic observation to test a hypothesis or research question. • Develop a scientific model for a complex situation. • Form conclusions from experimental data. • Cite evidence that living systems follow the laws of conservation of mass and energy. • Explain the physical properties of the sun and its dynamic nature and connect them to conditions and events on Earth.	This level has the same high cognitive demands as Level 3 with the additional requirement that students work over an extended period of time or with extended effort. Students are required to make several connections—relating ideas within the content area or among content areas—and have to select or devise one approach among many alternatives for how the situation or problem can be solved. It is important to note that the extended time period is not a distinguishing factor if the required work is only repetitive and does not require the application of significant conceptual understanding and higher-order thinking. **Some examples are:** • Based on provided data from a complex experiment that is novel to the student, deduce the fundamental relationship among several variables. • Conduct an investigation, from specifying a problem to designing and carrying out an experiment and analyzing data and forming conclusions. • Produce a detailed report of a scientific experiment or systematic observation, and infer conclusions based upon evidence obtained.

More detailed information about Florida's DOK levels is available online at http://www.cpalms.org/cpalms/dok.aspx.

Webb's Depth of Knowledge (DOK) Model of Cognitive Complexity

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 1
Recall or Reproduction…

is the recall of information such as a fact, definition, or term as well as performing a simple science process or procedure. Level 1 only requires students to demonstrate a rote response, restate information in their own words, and/or follow or perform a well-defined procedure.

Some Examples of Level 1 Performance

- Recall or recognize a fact, term, or property (e.g., how speed is determined).
- Represent a scientific concept or relationship in words or diagrams.
- Retrieve information from a chart, table, diagram, or graph.
- Recognize a standard scientific representation of a simple phenomenon (e.g., water cycle model).
- Identify common examples of topics, objects, and materials (e.g., familiar forces and invertebrates).
- Perform a routine procedure such as measuring length.

Question Stems

What is (was) _____?
What_____did you use?
What are some examples of_____?
How many _____?
Identify the _____?
Make a listing of_____?
Why did you choose_____?
How would you describe_____?
How can you recognize_____?
When did_____happen?
Recall what happened.
What happened when _____?
Retell.
Draw.
Select or retrieve _____?
What data represents _____?
Which_____has the most? Least?
Read your data table, chart, or graph.
Is_____ on the graph?
What pattern is seen when_____?

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 2
Basic Application…

is engaging in a mental process that goes beyond basic recall or reproduction, requiring two or more steps before giving a response. Students are asked to apply their knowledge of content on a simple level. Level 2 requires student to make some decisions as to how to approach a question or problem such as to classify, organize, and compare data.

Some Examples of Level 2 Performance

- Read and interpret information from a simple graph.
- Designate and explain the relationships among facts, terms, properties, and variables (e.g., compare physical properties of solids, liquids, and gases).
- Identify variable and controls in simple experiments.
- Distinguish between experiments and systematic observations.
- Describe and explain examples and non-examples of science concepts (e.g., flowering and non-flowering plants).
- Select a procedure according to specified criteria, and perform it.
- Formulate a routine problem given data and conditions.

Question Stems

Explain how_____affected_____.
Apply what you have learned to_____.
Compare/contrast.
How would you classify_____?
What could you use to classify?
How are_____alike? Different?
Summarize.
What do you notice about _____?
What do you observe? Infer?
What are some examples of_____?
What are some non-examples of_____?
Given the data, what was the testable question?
What variable is being tested?
What is the control group?
What procedure would you use?

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 3
Strategic Thinking…

requires reasoning, planning, using evidence, and complex and abstract thinking. The complexity results from there being multiple correct responses in which student justification is necessary and thorough. Level 3 asks students to cite evidence when developing a logical argument and to explain scientific phenomena in terms of concepts.

Some Examples of Level 3 Performance

- Design and execute an experiment or systematic observation to test a hypothesis or research question.
- Design and develop a scientific model to explain a scientific concept or theory.
- Form conclusions from experimental data.
- Cite evidence for scientific theory (e.g., energy is neither lost nor created within food chains and electrical circuits).
- Compare information within or across data sets (several monthly temperature graphs of the same city).
- Explain how political, social, and economic concerns can affect science, and vice versa.
- Explain the properties of the sun and its position within the solar system and then connect this knowledge to the condition and events occurring on Earth.

Question Stems

What conclusions can you draw?
How would you test_____?
What would the outcome be if_____?
What features of the graph should be considered when_____?
What question could we ask now?
What evidence should be considered?
Explain your thinking when there is more than one answer. Elaborate.
Formulate a reason as to why_____?
Which facts support _____?
What is the best answer? Why?
How would you adapt _____ to create a different _____?
How is_____related to_____?

Levels of Depth of Knowledge for Science
Adapted from the Florida Interim Assessment Item Bank and Test Platform

Level 4
Extended Thinking…

requires the same high cognitive demands as Level 3 with the additional requirement that students work over an extended period of time and/or with extended effort. Level 4 assessment items require significant thought.

Some Examples of Level 4 Performance

- Relate scientific concepts to other content areas (e.g., impact of environment changes).
- Develop generalizations of the results obtained and apply them to new situations (e.g., predict the weather in a particular place and time).
- Select or devise an approach among many alternatives for how a situation or problem is to be solved.
- Analyze multiple sources of evidence.
- Apply understanding in a new way, provide argument or justification for the application (e.g., using inertia).
- Conduct an investigation, from specifying a problem to designing and carrying out an experiment and analyzing data and forming conclusions.

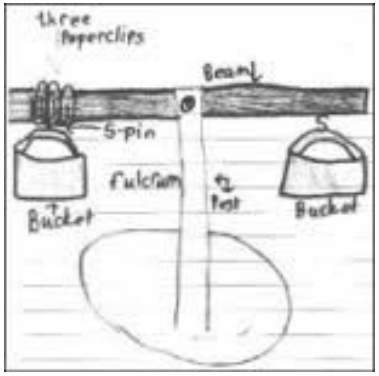
Question Stems/Tasks

What information can you gather to support your idea about_____?
Apply information from one text to another text to develop a persuasive argument.
Write a research paper/thesis on a topic from multiple sources.
Judge the value of material for a given purpose.
Consider multiple lines of inquiry to explain a particular scientific theory (e.g., conservation of mass and inertia).
Produce a detailed report of a scientific experiment or systematic observation, and infer conclusions based upon evidence obtained.
Provide time for extended thinking.
Assess through performance and open-ended activities.

Formative Assessment Strategies
Science K-5

APPENDIX A

Adapted from Page Keeley's *Science Formative Assessment: 75 Practical Strategies for Linking Assessment, Instruction, and Learning*

Strategy Name	Description	Additional Information
A & D Statements	*A & D Statements* analyze a set of "fact or fiction" statements. First, students may choose to agree or disagree with a statement or identify whether they need more information. Students are asked to describe their thinking about why they agree, disagree, or are unsure. In the second part, students describe what they can do to investigate the statement by testing their ideas, researching what is already known, or using other means of inquiry.	
Agreement Circles	*Agreement Circles* provide a kinesthetic way to activate thinking and engage students in scientific argumentation. Students stand in a circle as the teacher reads a statement. While standing, they face their peers and match themselves up in small groups of opposing beliefs. Students discuss and defend their positions. After some students defend their answers, the teacher can ask if others have been swayed. If so, stand up. If not, what are your thoughts? Why did you disagree? After hearing those who disagree, does anyone who has agreed want to change their minds? This should be used when students have had some exposure to the content.	**Energy** **1.** Energy is a material that is stored in an object. **2.** When energy changes from one form to another, heat is usually given off. **3.** Energy can never be created or destroyed. **4.** Something has to move in order to have energy.
Annotated Student Drawings	*Annotated Student Drawings* are student-made, labeled illustrations that visually represent and describe students' thinking about scientific concepts. Younger students may verbally describe and name parts of their drawings while the teacher annotates them.	

Strategy Name	Description	Additional Information

Card Sorts	*Card Sorts* is a sorting activity in which students group a set of cards with pictures or words according to certain characteristics or category. Students sort the cards based on their preexisting ideas about the concepts, objects, or processes on the cards. As students sort the cards, they discuss their reasons for placing each card into a designated group. This activity promotes discussion and active thinking.	
Chain Notes	*Chain Notes* is a strategy that begins with a question printed at the top of a paper. The paper is then circulated from student to student. Each student responds with one to two sentences related to the question and passes it on to the next student. A student can add a new thought or build on a previous statement.	**What is Matter?** Matter is all around us. Matter makes up everything. Matter has volume and takes up space. You can feel and see matter.
Commit and Toss	*Commit and Toss* is a technique used to anonymously and quickly assess student understanding on a topic. Students are given a question. They are asked to answer it and explain their thinking. They write this on a piece of paper. The paper is crumpled into a ball. Once the teacher gives the signal, they toss, pass, or place the ball in a basket. Students take turns reading their "caught" response. Once all ideas have been made public and discussed, engage students in a class discussion to decide which ideas they believe are the most plausible and to provide justification for the thinking.	**Solids and Holes** Lance has a thin, solid piece of material. He places it in water. It floats. He takes the material out and punches holes all the way through it. What do you think Lance will observe when he puts the material with holes back in the water? A. It will sink. B. It will barely float. C. It will float the same as it did before the holes were punched. D. It will neither sink nor float. It will bob up and down in the water. Explain your thinking. Describe the reason for the answer you selected.
Concept Card Mapping	*Concept Card Mapping* is a variation on concept mapping. Students are given cards with the concepts written on them. They move the cards around and arrange them as a connected web of knowledge. This strategy visually displays relationships between concepts.	

Strategy Name	Description	Additional Information

Concept Cartoons	*Concept Cartoons* are cartoon drawings that visually depict children or adults sharing their ideas about common everyday science. Students decide which character in the cartoon they agree with most and why. This formative assessment is designed to engage and motivate students to uncover their own ideas and encourage scientific argumentation. Concept Cartoons are most often used at the beginning of a new concept or skill. These are designed to probe students' thinking about everyday situations they encounter that involve the use of science. Not all cartoons have one "right answer." Students should be given ample time for ideas to simmer and stew to increase cognitive engagement.	 www.pixton.com
Data Match	*Data Match* provides students with a data set from a familiar investigation and several statements about data. Students use evidence from the data to determine which statements are accurate. This strategy provides students with an opportunity to consider what constitutes evidence, practice interpreting data, and consider how confident they are in interpreting results of an inquiry.	**Where We Put the Ice Cube** / **How Many Minutes It Took to Melt** On the blacktop in the sun — 3 On the blacktop in the shade — 7 On the grass — 10 On the metal side — 2 On the dirt underneath the slide — 5 **Which of these statements match your results?** The ice cube on the grass took longest to melt. The metal slide was hotter than the dirt underneath the slide. The ice cube melted faster on the blacktop in the sun than on the shaded blacktop. Ice placed on dark things melts faster than ice placed on light things. Ice melts faster on some surfaces than on others.
Fact First Questioning	*Fact First Questioning* is a higher-order questioning technique used to draw out students' knowledge. It takes a factual "what" question and turns it into a deeper "how" or "why" question. Teachers state the fact first and then ask students to elaborate, enabling deeper thinking processes that lead to a more enduring understanding of science concepts.	**Examples of Fact First Questions** Glucose is a form of food for plants. Why is glucose considered a food for plants? A cell is called the basic unit of life. Why is the cell called the basic unit of life? The patterns of stars in the night sky stay the same. Why do the patterns of stars in the night sky stay the same? Sandstone is a sedimentary rock. Why is sandstone considered a sedimentary rock?

Strategy Name	Description	Additional Information

<table>
<tr>
<td>Familiar Phenomenon Probes</td>
<td>Familiar Phenomenon Probes is a strategy involving two-tiered questions consisting of a selected response section and a justification for the selected response. They engage students in thinking about scientific ideas related to the phenomenon and committing to a response that matches their thinking. The distracters (wrong choices) include commonly held misconceptions that children have in science.</td>
<td>What's in the Bubbles?
Hannah is boiling water in a glass tea kettle. She notices large bubbles forming on the bottom of the kettle that rise to the top and wonders what is in the bubbles. She asks her family what they think, and this is what they may say:

Dad: They are bubble of heat.
Calvin: The bubbles are filled with air.
Grandma: The bubbles are an invisible form of water.
Mom: The bubbles are empty. There is nothing inside them.
Lucy: The bubbles contain oxygen and hydrogen that separated from the water.

Which person do you most agree with and why? Explain your thinking.</td>
</tr>
<tr>
<td>First Word-Last Word</td>
<td>First Word-Last Word is a variation of acrostic poetry. Students construct statements about a concept or topic before and after instruction that begins with the designated letter of the alphabet. The acrostic format provides a structure for them to build their idea statements off different letters that make up the topic word.</td>
<td>
<table>
<tr><th>First Word-Photosynthesis</th><th>Last Word-Photosynthesis</th></tr>
<tr><td>Plants make their own food.</td><td>Producers such as plants use energy from the sun to make their food.</td></tr>
<tr><td>Happens in cells</td><td>Happens in cells that have structures called chloroplasts</td></tr>
<tr><td>Other animals eat plants.</td><td>Organisms that eat plants are using energy from the plant.</td></tr>
<tr><td>The roots take up food and water.</td><td>The roots take water up to the leaves where it reacts with sunlight and carbon dioxide.</td></tr>
<tr><td>Oxygen is breathed in through leaves.</td><td>Oxygen is given off during photosynthesis and is used by plants and animals for respiration.</td></tr>
<tr><td>Sunlight makes food for plants.</td><td>Sunlight provides the energy so plants can make food.</td></tr>
<tr><td>You can't make your own food.</td><td>You need to have cells with chloroplast and chlorophyll to make food.</td></tr>
<tr><td>Needs water, sunlight, oxygen, and minerals</td><td>Needs water, carbon dioxide and sunlight to make food</td></tr>
<tr><td>The leaves, roots, and stems are all parts that make food.</td><td>The leaf is the food making part.</td></tr>
<tr><td>Have to have sun and water</td><td>Have to have sunlight, water, and carbon dioxide</td></tr>
<tr><td>Energy comes from the sun.</td><td>Energy comes from sunlight.</td></tr>
<tr><td>Sunlight turns plants green.</td><td>Sunlight is trapped in the chlorophyll.</td></tr>
<tr><td>It happens in all plants.</td><td>It is necessary life process for all plants.</td></tr>
<tr><td>Soil is used by plants to make food.</td><td>Soil holds the water for plants and gives some minerals.</td></tr>
</table>
</td>
</tr>
</table>

Strategy Name	Description	Additional Information

Fist to Five	*Fist to Five* asks students to indicate the extent of their understanding of a scientific concept by holding up a closed fist (no understanding), one finger (very little understanding), and a range up to five fingers (understand completely and can easily explain it to someone else). Fist to Five provides a simple feedback opportunity for all students in a class to indicate when they do not understand a concept or skill and need additional support for their learning.	 I do not understand it. I understand some of it. I understand most of it. I understand it completely. I understand it and can explain it.
Four Corners	*Four Corners* is a kinesthetic strategy. The four corners of the classroom are labeled: Strongly Agree, Agree, Disagree and Strongly Disagree. Initially, the teacher presents a science statement to students and asks them to go to the corner that best aligns with their thinking. Students then pair up to defend their thinking with evidence. The teacher circulates and records student comments. Next, the teacher facilitates a whole group discussion. Students defend their thinking and listen to others' thinking before returning to their desks to record their new understanding.	Agree Strongly Agree Strongly Disagree Disagree
Frayer Model	*Frayer Model* is a strategy that graphically organizes prior knowledge about a concept into an operational definition, characteristics, examples, and non-examples. It provides students with the opportunity to clarify what they are thinking about the concept and to communicate their understanding.	Definition Characteristics **Living Things** Examples Non-examples
Friendly Talk Probes	*Friendly Talk Probes* is a strategy that involves a selected response section followed by justification. The probe is set in a real-life scenario in which friends talk about a science-related concept or phenomenon. Students are asked to pick the person they most agree with and explain why. This can be used to engage students at any point during a unit. It can be used to access prior knowledge before the unit begins, or assess learning throughout and at the close of a unit.	**Talking about Gravity** Two friends are talking about gravity. Ben says, "Gravity needs atmosphere or air. If there is no air or atmosphere, there will be no gravity." Kelly says, "Gravity doesn't need an atmosphere or air. If there is no air or atmosphere, there will still be gravity." Which friend do you agree with?_____ Describe your thinking. Explain why you agree with one friend and disagree with the other.

Strategy Name	Description	Additional Information

Give Me Five	*Give Me Five* is a simple, quick technique for inviting and valuing public reflection and welcoming feedback from the students. Students should be given time to quietly reflect, perhaps through a quick write. Teacher selects five "volunteers" to share their reflection. NOTE: Deliberately select students for the purpose of reinforcing correct understanding and addressing misconceptions.	1. What was the most significant learning you had during today's lesson? 2. How "in the zone" do you feel right now as far as understanding the concept? 3. How did today's lesson help you better understand the concept? 4. What was the high point of this week's activities on the concept? 5. How well do you think today's science discussion worked in improving your understanding of the concept?
Human Scatterplot	*Human Scatterplot* is a quick, visual way for teacher and students to get an immediate classroom snapshot of students' thinking and the level of confidence students have in their ideas. Teachers develop a selective response question with up to four answer choices. Label one side of the room with the answer choices. Label the adjacent wall with a range of low confidence to high confidence. Students read the question and position themselves in the room according to their answer choice and degree of confidence in their answer.	
I Used to Think… But Now I Know…	*I Used to Think…But Now I Know* is a self-assessment and reflection exercise that helps students recognize if and how their thinking has changed at the end of a sequence of instruction. An additional column can be added to include…*And This Is How I Learned It* to help students reflect on what part of their learning experiences helped them change or further develop their ideas.	
Justified List	*Justified List* begins with a statement about an object, process, concept or skill. Examples that fit or do not fit the statement are listed. Students check off the items on the list that fit the statement and provide a justification explaining their rule or reasons for their selections. This can be done individually or in small group. Small groups can share their lists with the whole class for discussion and feedback. Pictures or manipulatives can be used for English-language learners.	**Making Sound** All of the objects listed below make sounds. Put an X next to the objects you think involve vibration in producing sound. ____guitar strings ____drum ____piano ____dripping faucet_____flute ____wind ____hammer ____crumpled paper ____thunderstorm ____barking dog ____screeching brakes Explain your thinking. What "rule" or reasoning did you use to decide which objects involve vibration?

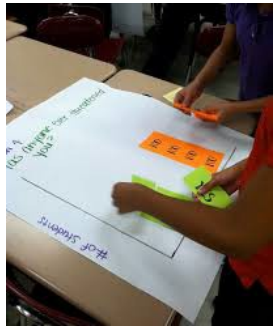
Strategy Name	Description	Additional Information

K-W-L Variations	*K-W-L* is a general technique in which students describe what they **K**now about a topic, what they **W**ant to know about a topic, and what they have **L**earned about the topic. It provides an opportunity for students to become engaged with a topic, particularly when asked what they want to know. *K-W-L* provides a self-assessment and reflection at the end, when students are asked to think about what they have learned. The three phrases of *K-W-L* help students see the connections between what they already know, what they would like to find out, and what they learned as a result.	
Learning Goals Inventory (LGI)	*Learning Goals Inventory (LGI)* is a set of questions that relate to an identified learning goal in a unit of instruction. Students are asked to "inventory" the learning goal by accessing prior knowledge. This requires them to think about what they already know in relation to the learning goal statement as well as when and how they may have learned about it. The *LGI* can be given back to students at the end of the instructional unit as a self-assessment and reflection of their learning.	
Look Back	*Look Back* is a recount of what students learned over a given instructional period of time. It provides students with an opportunity to look back and summarize their learning. Asking the students "how they learned it" helps them think about their own learning. The information can be used to differentiate instruction for individual learners, based on their descriptions of what helped them learn.	
Muddiest Point	*Muddiest Point* is a quick-monitoring technique in which students are asked to take a few minutes to jot down what the most difficult or confusing part of a lesson was for them. The information gathered is then to be used for instructional feedback to address student difficulties.	**Scenario:** Students have been using a hand lens to make observations of the details on a penny. *Teacher states, "I want you to think about the muddiest point for you so far when it comes to using a hand lens. Jot it down. I will use the information you give me to think about ways to help you better use the hand lens in tomorrow's lesson."*

Strategy Name	Description	Additional Information

Odd One Out	*Odd One Out* combines similar items/terminology and challenges students to choose which item/term in the group does not belong. Students are asked to justify their reasoning for selecting the item that does not fit with the others. Odd One Out provides an opportunity for students to access scientific knowledge while analyzing relationships between items in a group.	Properties of Matter: In each set, circle the ***Odd One Out*** and describe why it does not fit with the others.
Paint The Picture	*Paint the Picture* visually depicts students' thinking about an idea in science without using any annotations. This involves giving the students a question and asking them to design a visual representation that reveals their thinking and answers the question. *Paint the Picture* provides an opportunity for students to organize their thinking and represent their thinking in a creative, unique visual format.	What role do minerals play in the formation of a rock? minerals rock
Partner Speaks	*Partner Speaks* provides students with an opportunity to talk through an idea or question with another student before sharing with a larger group. When ideas are shared with the larger group, pairs speak from the perspective of their partner's ideas. This encourages careful listening and consideration of another's ideas.	**Today we are going to investigate how objects float and sink in water.** - *What do you think affects whether an object floats or sinks in water?* - *What can you do to change how an object floats or sinks?* **Turn to your partner and take turns discussing ideas.**
Pass the Question	*Pass the Question* provides an opportunity for students to collaborate in activating their own ideas and examining other students' thinking. Students begin by working together in pairs to respond to a question. Time is allotted for partial completion of their responses. When the time is up, they exchange their partially completed response with another pair. Students are provided time to finish, modify, add to, or change it as they deem necessary. Pairs then group to give feedback to each other on the modifications.	What are the phases of the moon? Can sound travel through a solid? What is the difference between temperature and humidity? Are science tools helpful? How can you measure matter?
A Picture Tells a Thousand Words	*A Picture Tells a Thousand Words* is a technique where students are digitally photographed during an inquiry-based activity or investigation. They are given the photograph and asked to describe and annotate what they were doing and learning in the photo. Images can be used to spark student discussions, explore new directions in inquiry, and probe their thinking as it relates to the moment the photograph was taken.	

Strategy Name	Description	Additional Information

Question Generating	*Question Generating* is a technique that switches roles from the teacher as the question generator to the student as the question generator. The ability to formulate good questions about a topic can indicate the extent to which a student understands ideas that underlie the topic. This technique can be used any time during instruction. Students can exchange or answer their own questions, revealing further information about the students' ideas related to the topic.	**Question Generating Stems:** • Why does_ _? • How does_ _? • What if___? • What could be the reason for___? • What would happen if _? • How does _compare to _? • How could we find out if___?
Sticky Bars	*Sticky Bars* is a technique that helps students recognize the range of ideas that students have about a topic. Students are presented with a short answer or multiple-choice question. The answer is anonymously recorded on a Post-it note and given to the teacher. The notes are arranged on the wall or whiteboard as a bar graph representing the different student responses. Students then discuss the data and what they think the class needs to do in order to come to a common understanding.	
Thinking Logs	*Thinking Logs* is a strategy that informs the teacher of the learning successes and challenges of individual students. Students choose the thinking stem that would best describe their thinking at that moment. Provide a few minutes for students to write down their thoughts using the stem. The information can be used to provide interventions for individuals or groups of students as well as match students with peers who may be able to provide learning support.	□ I was successful in… □ I got stuck… □ I figured out… □ I got confused when…so I… □ I think I need to redo… □ I need to rethink… □ I first thought…but now I realize… □ I will understand this better if I… □ The hardest part of this was… □ I figured it out because… □ I really feel good about the way…
Think-Pair-Share	*Think-Pair-Share* is a technique that combines thinking with communication. The teacher poses a question and gives individual students time to think about the question. Students then pair up with a partner to discuss their ideas. After pairs discuss, students share their ideas in a small-group or whole-class discussion. (Kagan) NOTE: Varying student pairs ensures diverse peer interactions.	

Strategy Name	Description	Additional Information

Traffic Light Cups	*Traffic Light Cups* is a monitoring strategy that can be used at any time during instruction to help teachers gauge student understanding. The colors indicate whether students have full, partial, or minimal understanding. Students are given three different-colored cups, asked to self-assess their understanding about the concept or skill they are learning, and display the cup that best matches their understanding.	
Two-Minute Paper	*Two-Minute Paper* is a quick way to collect feedback from students about their learning at the end of an activity, field trip, lecture, video, or other type of learning experience. Teacher writes two questions on the board or on a chart to which students respond in two minutes. Responses are analyzed and results are shared with students the following day.	• What was the most important thing youlearned today? • What did you learn today that you didn't know before? • What important question remains unanswered for you? • What would help you learn better tomorrow?
Two Stars and a Wish	*Two Stars and a Wish* is a way to balance positive and corrective feedback. The first sentence describes two positive commendations for the student's work. The second sentence provides one recommendation for revision. This strategy could be used teacher-to-student or student-to-student.	
3-2-1	*3-2-1* is a technique that provides a structured way for students to reflect upon their learning. Students respond in writing to three reflective prompts. This technique allows students to identify and share their successes, challenges, and questions for future learning. Teachers have the flexibility to select reflective prompts that will provide them with the most relevant information for data-driven decision making.	**Sample 1** □ **3 – Three** key ideas I will remember □ **2 – Two** things I am still struggling with □ **1 – One** thing that will help me tomorrow **Sample 2**