K-2 Standard 1 – Intended Learning Outcomes

The Processes of Science, Communication of Science, and the Nature of Science Students will be able to apply scientific processes, communicate scientific ideas effectively, and understand the nature of science.					
Standard 1 The Processes, Communication, and Nature of Science	**Indicator 1**	**Indicator 2**	**Indicator 3**	**Indicator 4**	**Indicator 5**
Objective 1. **Generating Evidence:** **Using the processes of scientific investigation (i.e. framing questions, designing investigations, conducting investigations, collecting data, drawing conclusions)**	Framing questions: Observe using senses, create a hypothesis, and focus a question that can lead to an investigation.	Designing investigations: Consider reasons that support ideas, identify ways to gather information that could test ideas, design fair tests, share designs with peers for input and refinement.	Conducting investigations: Observe, manipulate, measure, describe.	Collecting data: Deciding what data to collect and how to organize, record, and manipulate the data.	Drawing conclusions: Analyzing data, making conclusions connected to the data or the evidence gathered, identifying limitations or conclusions, identifying future questions to investigate.
Objective 2. **Communicating Science:** **Communicating effectively using science language and reasoning**	Developing social interaction skills with peers.	Sharing ideas with peers.	Connecting ideas with reasons (evidence).	Using multiple methods of communicating reasons/evidence (verbal, charts, graphs).	
Objective 3. **Knowing in Science:** **Understanding the nature of science**	Ideas are supported by reasons.	There are limits to ideas in science (i.e. what can be observed, measured, and verified).	Differences in conclusions are best settled through additional observations and investigations.	Communication of ideas in science is important for helping to check the reasons for ideas.	

Standard 1 is not to be taught as stand-alone content, but is integrated into the teaching of the Content Standards (Standards 2, 3, and 4)

Science Content by Standard – Standard 2

Standard 2 – Earth and Space Science

Students will gain an understanding of Earth and Space Science through the study of earth materials, celestial movement, and weather.

	Kindergarten	First Grade	Second Grade
Objective 1	Investigate non-living things.	Investigate the natural world including rock, soil and water.	Describe the characteristics of different rocks.
Indicators:	– Observe and record that big rocks break down into small rocks, e.g., boulders, rocks, pebbles, sand. – Demonstrate how water and wind move non-living things. – Sort, group, and classify Earth materials, e.g., hard, smooth, rough, shiny, flat.	– Observe, compare, describe, and sort components of soil by size, texture, and color. – Identify and describe a variety of natural sources of water, including streams, lakes, and oceans. – Gather evidence about the uses of rocks, soil, and water.	– Explain how smaller rocks come from the breakage and weathering of larger rocks. – Describe rocks in terms of their parts (e.g. crystals, grains, cement). – Sort rocks based upon color, hardness, texture, layering, particle size and type (i.e. igneous, metamorphic, sedimentary).
Objective 2	Observe and describe changes in day and night.	Observe and describe the changes and appearance of the sun and moon during daylight.	Observe and record recognizable objects and patterns in the night sky.
Indicators:	– Compare and contrast light and dark in a day-night cycle and identify the changes as a pattern. – Investigate, interpret, and explain to others that the sun provides heat and light to Earth. – Examine what happens when you block the sun's light. Explore shadows and temperature changes.	– Observe the sun at different times during the day and report observations to peers. – Observe and chart the moon when it is visible during the day.	– Observe, describe, and record patterns in the appearance and apparent motion of the moon in the night sky. – Observe and describe the number, arrangement and color/brightness of stars in the night sky.
Objective 3	Compare changes in weather over time.	Compare and contrast seasonal weather changes.	Observe, describe, and measure seasonal weather patterns and local variations.
Indicators:	– Observe and record that weather changes occur from day-to-day and weather patterns occur from season to season. – Communicate ways weather can affect individuals. – Describe, predict, and discuss daily weather conditions and how predicting the weather can improve our lives.	– Identify characteristics of the seasons of the year. – Identify characteristics of weather, e.g., types of precipitation, sunny, windy, foggy, and cloudy. – Observe and record weather information within each season.	– Compare and contrast the seasonal weather patterns during the school year. – Analyze and interpret data such as temperatures in different locations and different times.

Science Content by Standard – Standard 3

Standard 3 – Physical Science

Students will gain an understanding of Physical Science through the study of the forces of motion and the properties of materials.

	Kindergarten	First Grade	Second Grade
Objective 1	Identify how non-living things move.	Analyze changes in the movement of non-living things.	Communicate observations about falling objects.
Indicators:	– Observe and record how objects move in different ways, e.g., fast, slow, zigzag, round and round, up and down, straight line, back and forth, slide, roll, bounce, spin, swing, float, and glide. – Compare and contrast how physical properties of objects affect their movement, e.g., hard, soft, feathered, round, square, cone, geometric shapes.	– Describe, classify, and communicate observations about the motion of objects, e.g., straight, zigzag, circular, curved, back-and-forth, and fast or slow. – Compare and contrast the movement of objects using drawings, graphs, and numbers. – Explain how a push or pull can affect how an object moves.	– Observe falling objects and identify things that prevent them from reaching the ground. – Communicate observations that similar objects of varying masses fall at the same rate.
Objective 2	Describe parts of non-living things.	Analyze objects and record their properties.	Compare and contrast the differences in how different materials respond to change.
Indicators:	– Describe how parts are used to build things and how things can be taken apart. – Explain why things may not work the same if some of the parts are missing.	– Sort, classify, and chart objects by observable properties, e.g., size, shape, color, and texture. – Predict measurable properties such as weight, temperature, and whether objects sink or float; test and record data. – Predict, identify, and describe changes in matter when heated, cooled, or mixed with water.	– Model physical changes of various materials. – Investigate and provide evidence that matter is not destroyed or created through changes.

Science Content by Standard – Standard 4

Standard 4 – Life Science

Students will gain an understanding of Life Science through the study of changes in organisms over time and the nature of living things.

	Kindergarten	First Grade	Second Grade
Objective 1	**Investigate living things.**	**Communicate observations about the similarities and differences between offspring and between populations.**	**Tell how external features affect an animals' ability to survive in its environment.**
Indicators:	– Construct questions, give reasons, and share findings about all living things. – Compare and contrast young plants and animals with their parents. – Describe some changes in plants and animals that are so slow or so fast that they are hard to see (e.g., seasonal change, "fast" blooming flower, slow growth, hatching egg).	– Communicate observations about plants and animals, including humans, and how they resemble their parents. – Analyze the individual similarities and differences within and across larger groups.	– Compare and contrast the characteristics of living things in different habitats. – Develop, communicate, and justify an explanation as to why a habitat is or is not suitable for a specific organism. – Create possible explanations as to why some organisms no longer exist, but similar organisms are still alive today.
Objective 2	**Describe the parts of living things.**	**Living things change and depend upon their environment to satisfy their basic needs.**	**Identify basic needs of living things (plants and animals) and their abilities to meet their needs.**
Indicators:	– Differentiate between the five senses and related body parts. – Identify major parts of plants, e.g., roots, stem, leaf, flower, trunk, branches. – Compare the parts of different animals, e.g., skin, fur, feathers, scales; hand, wing, flipper, fin.	– Make observations about living things and their environment using the five senses. – Identify how natural earth materials (e.g., food, water, air, light, and space), help to sustain plant and animal life. – Describe and model life cycles of living things.	– Communicate and justify how the physical characteristics of living things help them meet their basic needs. – Observe, record, and compare how the behaviors and reactions of living things help them meet their basic needs. – Identify behaviors and reactions of living things in response to changes in the environment including seasonal changes in temperature and precipitation.

Appendix A (continued)
Big Ideas – Second Grade

Standard 1 The Processes (PoS), Communication (CoS), and Nature (NoS) of Science (Intended Learning Outcomes).	Standard 2 Earth (E) and Space Science (S)	Standard 3 Physical Science Atomic-molecular theory of matter (A) and Newtonian laws of force and motion (F)	Standard 4 Life Science Changes in organisms over time (CT) and the nature of living things (N).
(P) When science investigation is done the way it was done before, we expect to get a very similar result. (N) Sometimes people aren't sure what will happen because they don't know everything that might have an effect. (C) In doing science, it is often helpful to work with a team and to share findings with others. All team members should reach their own individual conclusions, however, about what the findings mean.	(E) Chunks of rocks come in many sizes and shapes, from boulders to grains of sand and even smaller (S) There are recognizable patterns among objects in the night sky. (E) Some changes, such as changes in weather can vary based on season and location.	(F) Things near the earth fall to the ground unless something holds them up. (A) Things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.	(N) All living things need water, food, air, waste removal, and a particular range of temperatures in their environment. (N) Animals, including humans, have parts that help them seek, find, and take in food when they feel hunger—eyes and noses for detecting food, legs to get it, arms to carry it away and a mouth to eat it. (N) Senses can warn individuals about danger; muscles help them to fight, hide, or get out of danger. (CT) Some kinds of living things that once lived on earth have completely disappeared, although they were something like others that are alive today. (CT) Different plants and animals have external features that help them thrive in different kinds of places. (CT) Living things are found almost everywhere in the world. There are somewhat different kinds in different places.

Earth and Space Science	Physical Science	Life Science	Processes, Communication, and Nature of Science	Applications: Science, Technology, and Society
(E) Earth science (SS) Space science	(A) Atomic/molecular (F) Force and motion	(CT) Changes over time (N) Nature of Living Things	(PoS) Processes of science (CoS) Communication of science (NoS) Nature of science	(T) Tools of science (A) Applications of science (S) Implications of science for people

Appendix B (continued)
What Students Should Understand, Do, and Know

By the end of Second Grade students should be able to:

Understand:

- When science investigation is done the way it was done before, we expect to get a very similar result.
- Sometimes people aren't sure what will happen because they don't know everything that might have an effect.
- It is often helpful to work with a team and to share findings with others. All team members should reach their own individual conclusions, however, about what the findings mean.
- Chunks of rocks come in many sizes and shapes, from boulders to grains of sand and even smaller.
- There are recognizable patterns among objects in the night sky.
- Some changes, such as changes in weather can vary based on season and location.
- Things near the earth fall to the ground unless something holds them up.
- Things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.
- All living things need water, food, air, waste removal, and a particular range of temperatures in their environment.
- Animals, including humans, have parts that help them seek, find, and take in food when they feel hunger—eyes and noses for detecting food, legs to get it, arms to carry it away and a mouth to eat it.
- Senses can warn individuals about danger; muscles help them to fight, hide, or get out of danger.
- Some kinds of living things that once lived on earth have completely disappeared, although they were something like others that are alive today.
- Different plants and animals have external features that help them thrive in different kinds of places.
- Living things are found almost everywhere in the world. There are somewhat different kinds in different places.

Do:

- Explain weathering and breakage of rocks.
- Describe, classify, and communicate scientific ideas, e.g., ,rocks in terms of their parts, stars in the night sky,
- Observe, compare, describe and sort objects by their characteristics and properties, e.g., color, hardness, texture, layering, particle size
- Observe, describe, record, and compare patterns in nature.
- Compare and contrast, e.g., seasonal weather patterns, characteristics of living things in various habitats

- Observe and identify scientific phenomena, e.g., observe falling objects and identify things that prevent them from reaching the ground.
- Communicate about their observations, e.g., similar objects of varying masses fall at the same rate.
- Model changes in various materials, e.g., physical changes
- Analyze and interpret data, e.g. temperatures in different locations and different times,
- Investigate and provide evidence to others.
- Develop, communicate, and justify a scientific explanation, e.g., why a habitat is or is not suitable for a specific organism, how the physical characteristics of living things help them meet their basic needs.
- Create possible explanations for natural phenomena, e.g., why some organisms no longer exist but similar organisms are still alive today. Identify responses of living things to their environment.
- Communicate and share findings with others.
- Conduct simple experiments and explain their findings.
- Construct questions, give reasons, and share findings with others.

Know:

- Smaller rocks come from the breakage and weathering of larger rocks.
- Rocks have parts that can be used in their classification.
- Rocks can be sorted by their color, hardness, texture, layering, and particle size.
- Changes in the moon's appearance and apparent motion can be described in terms of patterns.
- Stars have brightness and color differences and can be described by their arrangement.
- The seasons of the year have discernible patterns.
- Temperatures can and do change based on location and time.
- Objects close to the earth fall toward it but can be stopped before reaching the ground.
- Similar objects of varying masses will fall at the same rate.
- Physical changes can occur to earth materials.
- Matter is not destroyed or created through changes.
- Living things in different habitats have characteristics that can be compared and contrasted .
- Different habitats are suitable for different organisms.
- Some organisms that once lived on the earth no longer exist though similar organisms are still on the earth.
- The physical characteristics of living things along with their behaviors and reactions help them to meet their basic needs.
- The behaviors and reactions of living things can and do change in response to changes in the environment including seasonal changes.