



KINDERGARTEN
Literacy Guide



KINDERGARTEN Literacy Guide

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Introduction

Introduction to the *Knowing Science*[®] Literacy Guide

Elementary science instruction today features teachers introducing students to the investigative practices of “real” scientists to answer their questions about the natural world. Why do objects move or stop moving? Why do earthquakes happen? Why do baby mammals look like smaller versions of their parents?

When students generate inquiries about the natural world, they embark on a journey to find the answers. They make observations, read books, or search the Internet for relevant information. They plan investigations, make predictions, and suggest answers. They perform experiments, accumulate and analyze data, and communicate their findings to others orally and/or in writing. Introducing students to these genuine scientific procedures during their formative years encourages critical thinking and excitement about science.

Evidence suggests that children learn science best in the context of an interdisciplinary approach. It is clear that mathematics and science are inextricably linked, but the important role literacy plays in the study of science has received less attention. When children engage in science content as one of the contexts for developing literacy skills, they not only become well informed about science; they also develop proficient reading, writing, and speaking skills. Student scientists, just like professional scientists, must possess good reading and communication skills in order to conduct research and share the results effectively.

The *Knowing Science* program employs both fiction and nonfiction to assist in developing students’ understanding of science. Most young children have a strong concept of story. In kindergarten, children’s literature (which sometimes adds fact to fiction) motivates students to follow a story line and at the same time acquire important information and concepts. In first and second grade, fiction still plays a role in understanding science concepts, but nonfiction science trade books (NOT textbooks) assume growing importance as sources of accurate information about various topics. Nonfiction titles help students learn facts about a topic through text, photographs, charts, maps, and the visual presentation of data.

Integrating literacy—reading, writing, and speaking—into the study of science is one of the strengths of the *Knowing Science* program. For those seeking to incorporate literacy into the teaching of science, the *Knowing Science Literacy Guide* suggests how to embed literacy into the content of *Knowing Science* units.

Guide to Lesson

Using the Knowing Science® Literacy Guide

At the K-3 levels, selected sessions in the *Knowing Science* Teacher's Manual have a corresponding entry in the *Knowing Science* Literacy Guide. The following elements are contained in each of the entries.

PURPOSE

Outlines the main concepts of the unit and describes the kinds of literature that can be used to complement the science themes and enhance students' understanding of the topic.

OBJECTIVES

Provides a list of the learning goals for a specific lesson.

RECOMMENDED LITERATURE

Provides a list of recommended titles, along with their authors and Lexile ratings. Also furnishes additional titles that you may wish to use because their Lexile levels are appropriate for specific individuals or small groups of students in your class. Titles that fall into this category carry a general rather than detailed suggestion for how to use them during the course of the lesson.

EMBEDDING LITERATURE

A detailed description of how to use the recommended titles during the course of a lesson.

BUILDING LANGUAGE FOR LITERACY

If applicable... Provides opportunities in some lessons to develop students' acquisition of vocabulary, as well as oral language structures to talk about scientific subject matter. For example, sentence frames guide students to communicate about aspects of the lesson in correct grammatical form. The repeated use of this approach fosters fluent expressive language skills around the content of the curriculum.

Tips & Tricks: Integrating Science with Literacy

There are many good reasons to include science literature as part of a balanced literacy program. The most important reason is that to teach science well, *science must be done and not just read about*. Effective science teaching requires students to actively engage in experiences that are relevant and applicable to their daily lives.

Reading and responding to quality science literature supports science learning. It leads to better comprehension and retention of science concepts. Students are able to transfer topic-specific information from one instructional setting to another (from science to literacy and literacy to science). Additionally, skills needed for understanding and responding to science texts (or any informational text) are applicable to other subject areas and not limited to use only during literacy time.

Comprehension skills required to read informational text are different from the skills required to read narrative text. This is because informational text tends to include many details in a small amount of writing, both at the sentence level and at the paragraph level. Therefore, to understand the author's message, informational text needs to be read more slowly. Repeated readings may be necessary in order to fully extract the meaning from the text.

Students benefit from actively reading nonfiction text. This requires frequent stops to ask questions (*What did I just read? What details were included? What do I want to know more about?*) and to react (*Wow – that just got my attention!*). Active reading also involves making connections – to self and personal experiences; to other texts, movies, or videos on the same topic; and to events in the world.

Text features may give as much if not more information than written text. If informational reading is new to students, they may have seen text features before but may not know why or how they are used. Arranging a “text feature hunt” is an easy way to introduce students to features such as:

- Table of contents, glossary, index
- Main heading (title) and subheadings or chapter titles
- Special print: **boldface**, *italics*, or **highlighted**
- Bulleted lists of information
- Diagrams: illustrations labeled to show parts
- Captions: usually a sentence or two that describes an image
- Text box, inset box, or call out: to define vocabulary or “fun facts”
- Illustrations such as photographs and drawings
- Other graphics: graphs, charts, tables, maps, timelines, Venn diagrams

Informational text is organized differently from narrative text. It may be structured in any of several ways, depending on the author's purpose. Here is a list of text structures, along with uses and examples of signal words featured in each type of text:

Description	Uses topic-specific vocabulary and details to create a mental image for the reader <i>first of all; an example is; such as; also</i>
Comparison	Discusses similarities and differences between two objects or ideas <i>same; both; different; unlike; similar to; also</i>
Sequence, Order, or Procedural	List of events that have occurred or should occur in a set order <i>first; next; then; last; finally; after that; before that; numbered list</i>
Cause and Effect (Before and After)	What causes an event and the resulting change <i>because of; before; after; since; as a result of; however</i>
Problem and Solution	A problem or task to be solved is described along with possible solutions <i>problem; task; issue; answer; possible; solution; try</i>
Fact and Opinion	The author states a claim and then gives detailed reasons to support the claim <i>one reason is; another reason is; finally</i>

When writing responses to informational text, have students answer questions in complete sentences, using topic-specific vocabulary from the question. This strategy is sometimes referred to as “TTQA” or **T**urn **T**he **Q**uestion **A**round. For example:

Question: How do *all food chains begin*?

Answer: *All food chains begin* with energy from the Sun.

Written responses should mirror the specific type of text structure (description, comparison, procedural, cause/effect, problem/solution or fact/opinion). Responses should include signal words that are characteristic to each type of text. For example:

Question: How are solids *different* than liquids?

Answer: Solids have their own shape, *but* liquids take the shape of their container. They *both* take up space and have mass.

Guided reading groups may take several forms, depending on the needs of your specific class and available resources. One approach is using *leveled readers*. When using leveled readers, the books will all cover the same topic but will be at different reading levels. Questions written specifically for each title may be used. If that is not possible, use a generalized graphic organizer for each title, such as the ones shown below:

Name _____

Directions: Make a bulleted list of details for each section under its subheading.

Name _____

Wow Facts! Outline

Directions: Read the text. List at least two key details or "Wow Facts" below. You may also add a sketch for your ideas. Then list any "Connect" ideas you have after reading these pages.

Wow Facts:	Quick Sketch
_____	_____
_____	_____
_____	_____
_____	_____

Connect: (This reminds me of.....)

Another approach is to use the *same book* and same set of questions. Different levels of support can be provided for each ability group. One group will need little support, one will need moderate support, and one will need a greater amount of direct support and instruction. Questions may be modified as needed to meet the needs of each group. The number of questions and required length of responses may be adjusted for each ability level. Challenge or bonus questions may be provided for groups or individuals that finish early.

A third approach is *parallel reading*. Each group reads a different subtopic of a main idea or topic. For example, when studying natural disasters, one group might read about volcanoes, another about earthquakes, and a third about tsunamis. A general graphic organizer or parallel questions may be used. Parallel questions ask for the same information, but specific answers vary. For example:

- What causes the natural disaster?
- What happens to surrounding areas during the disaster?

Integrating science literature into a balanced literacy program benefits students in many ways. It promotes better retention of knowledge, and it encourages development and transference of skills across subject areas. Any time a student finds a connection between multiple segments of learning, the result is always a better-quality learning experience.

PHYSICAL SCIENCE

UNIT 1: MEASUREMENT

Comparison is the main theme of Unit 1. Students compare objects to determine whether they are the same or different, and they sort and classify objects depending on their characteristics. Finally, students learn to compare objects to measuring tools. The goal is for students to understand conceptually that measurement is essentially a comparison to a standard.

Students progress from comparing height and length to comparing objects' weights to comparing the capacity of containers. During the course of this journey, they transition from qualitative (sensory and descriptive) comparisons of objects to quantifying properties of objects.

Children's literature plays a role in engaging students in the topics of comparison and measurement. Various titles introduce, summarize, supplement, or reinforce the concepts in this unit. Books that work well for this unit include those that focus on comparing the characteristics of objects or people or animals, especially in terms of length, height, weight, or capacity. Other relevant titles are those that feature sorting and the use of standard and nonstandard units.

The titles listed below fit the criteria for inclusion in this unit.

RECOMMENDED LITERATURE

Recommended titles are listed below, along with their authors and Lexile ratings. The list is followed by suggested strategies for incorporating the books into the unit's science lessons.

LESSON NUMBER	TITLE	AUTHOR	LEXILE LEVEL
1.1 Same or Different?	<i>What is an Attribute?</i>	Nancy Kelly Allen	10L
	<i>The Ant and the Elephant</i>	Bill Peet	720L
1.2 Seeing the Difference: Comparing Height and Length	<i>The Best Bug Parade</i>	Stuart J. Murphy	200L
	<i>Curious George Roller Coaster</i>	H. A. Rey	390L
1.3 Feeling the Difference: Comparing Weight	<i>Mighty Maddie</i>	Stuart J. Murphy	----
1.4 How Much Will It Hold: Comparing Capacity	<i>A House for Birdie</i>	Stuart J. Murphy	----
	<i>Room for Ripley</i>	Stuart J. Murphy	570L

Lesson 1.1: Same or Different?

PURPOSE

Comparison is an important foundational skill for students to learn, one that will serve them well as they progress in their study of science. Science depends heavily on measurement, which is essentially a comparison between new observations and known standards. The purpose of this lesson is to provide students with practice in identifying how sets of objects are the same as one another or different from one another. The process of making this identification necessarily involves the act of comparing the characteristics of objects.

OBJECTIVES

By the end of the lesson, students will be able to:

- Identify and describe two objects as the same or different
- Communicate their understanding of same and different

EMBEDDING LITERACY

Session 1: *Is it the same or different?*

The teacher's first task in this session is to assess what students already know about the concepts of same and different. To help assess students' prior knowledge of the concepts, read *What is an Attribute?*

- Ask students to answer the questions posed in the text.
- Call students' attention to the many cars pictured on page 23. Ask them to determine which cars are alike and which are different and to give evidence for their answers.

Continue with the session, comparing various items contained in the *Let's Teach Comparison Kit*.

At the conclusion of **Session 1**, read *The Ant and the Elephant* to reinforce the idea of comparison.

The Ant and the Elephant Bill Peat

In this classic children's story, the elephant rescues other jungle animals in distress. But who will help him when he needs it? The book emphasizes the importance of working together and helping others and at the same time provides an opportunity for students to practice the skill of comparison.

- Before beginning to read, invite students to look at the book's cover and describe what they see. Based on the picture, what do they predict the story will be about?

- As you read, stop now and then to ask students how the animal pictured on the left-hand page is like the animal depicted on the right-hand page. Then question students about how the two animals are different.
- Guide students to understand that they have *compared* the animals by identifying what is the same (for instance, having four legs) and what is different (varying sizes, and so on).
- At the story's conclusion, have students explain what is unusual about the ants helping the elephant. Encourage them to use what they know about the weights of different objects in their answers.

Lesson 1.2 Seeing the Difference: Comparing Height and Length

PURPOSE

Knowing the concepts of same and different is foundational to the act of comparing. Developing an awareness and understanding of the concept of length (recognizing objects as shorter, longer, or taller) is a simple form of classification essential to understanding linear measurement. The purpose of this lesson is to develop the concept of length through both direct comparison and the use of nonstandard units of measurement.

OBJECTIVES

By the end of the lesson, students will be able to:

- Compare three or more objects according to their length as same or different; long, longer, longest; tall, taller, tallest; short, shorter, shortest
- Describe the length of different objects using comparative language
- Use direct comparison and nonstandard units to measure the length of common objects

EMBEDDING LITERACY

Session 1: *Is it longer or shorter?*

In this session, students begin to explore the concept of length. Introduce the session by reading *The Best Bug Parade* aloud to the class.

The Best Bug Parade
Stuart J. Murphy

With colorful pictures, this book introduces youngsters to the concept and language of comparison. The author focuses on the concepts of big, small, long, and short.

- As you read the story, ask students to describe/discuss what is happening in each picture. For example, you might ask:
 - Do the bugs look the same or different?
 - *How* are the bugs the same?
 - *How* are they different?

After discussing the book, continue with the remainder of the session.

Session 3: *How can we compare the heights of our class members?*

This session presents an optional activity for students. They can apply what they have learned about comparing the height of books to the task of sorting themselves into height order.

Begin the activity by reading *Curious George Roller Coaster* for a “real life” anecdote about the results of a direct comparison of height.

Curious George Roller Coaster

H. A. Rey

Curious George wants more than anything to ride on a roller coaster. Why can't he? How does his dream come true? The story provides a “real life” example involving direct comparison of height.

- Before beginning to read, show students the cover of the book and ask them where they think the story takes place. Have them provide evidence for their answers.
- Start reading the book. Ask students to listen for the reason George is not allowed to go on the roller coaster. How does the man at the gate figure out George is too short?
- Toward the end of the story, how does Captain Zany make George's wish come true?
- Have you ever been to a carnival and had to measure yourself against a height line before being admitted to a ride? Why do you think you had to be a certain height to enjoy the ride?

Continue the session by asking students how they can approach the task of putting themselves in height order.

Lesson 1.3 Feeling the Difference: Comparing Weight

PURPOSE

Comparison is one of the “big” ideas of science. Knowing the concepts of same and different is foundational to the concept of comparing. Developing an awareness and understanding of the concept of weight is essential to understanding measurement. The purpose of this lesson is to develop the concept of weight (same or different; heavier or lighter) through both direct comparison and use of nonstandard units of measure.

OBJECTIVES

By the end of the lesson, students will be able to:

- Compare two objects according to their weight as *about the same* or *different*; *heavier* or *lighter*
- Describe the weight of different objects as *heavy (heavier)* or *light (lighter)*
- Use a balance and nonstandard units to measure the weight of common objects

EMBEDDING LITERACY

Session 1: *Is it the same, heavier, or lighter?*

After introducing the concept of weight and giving students the opportunity to feel whether an object in one hand is heavier or lighter than an object in the other, but before closing the session, introduce students to Mighty Maddie, the cleaning wonder girl.

Mighty Maddie Stuart J. Murphy

Maddie’s birthday party is just two hours away, but the house is not ready. The house is a mess because her toys are scattered everywhere. Her dad offers to help carry things to her room, and Maddie suddenly seems to have turned into a cleaning dynamo! Along the way, readers get insights into comparing weights and discovering that large objects are not always the heaviest nor are small ones always the lightest.

- Before reading the book aloud to students, ask them to look at the cover. Is there anything in the picture to suggest that Maddie might be a super hero? If so, what details hint at her super-girl status?
- Maddie’s dad offers to help her clean up and says he will help her carry heavy things to her room. Invite students to look at all the objects on the floor on pages 10-11. Which objects do they think Dad will carry for Maddie because they are heavy? Ask children to explain their reasoning. If desired, make a chart with two columns—light objects and heavy objects—and record students’ responses on it.

- Ask students to look closely at the picture on pages 26-27. What has happened to the toys? Is Maddie really a super hero? How did she manage to clean up her room so quickly?

Lesson 1.4 How Much Will It Hold? Comparing Capacity

PURPOSE

Comparison is one of the “big ideas” of science. Developing an awareness and knowledge of the concept of capacity is a simple form of classification essential to understanding measurement. The purpose of this lesson is to explore and develop the concept of capacity through direct comparison, using materials and containers common to daily life and experiences.

Capacity and volume are linked concepts. Capacity is the amount of something a container will hold. Volume is the amount of space a solid, liquid, or gas takes up. Understanding capacity will lead to understanding volume in later grades.

OBJECTIVES

By the end of the lesson, students will be able to:

- Compare relative capacities of various common containers
- Describe the capacity of the containers using comparative words such as *some*, *more*, and *most*
- Work cooperatively to share materials and complete tasks

EMBEDDING LITERACY

Session 1: *How much will your hands hold?*

The beginning of the lesson introduces students to the concept of capacity by asking them which bowls they think would hold more cereal and so on. After the discussion, continue exploring the concept by reading aloud *A House for Birdie*.

A House for Birdie Stuart J. Murphy

Tiny little Birdie has no house and is tired of having to endure the wet and the cold, so he asks his bird friends to help him find a house that will protect him from the elements. The house can't be too tall, too thin, too short, too fat, too wide, or too narrow. It has to fit him perfectly. This is a story of friendship that also explores the concept of capacity.

- Show students the book's cover where seven birdhouses are depicted. Ask the group: What is the same about all the birdhouses? What is different?
- Show students the picture on pages 4-5. Ask students to guess why Birdie might want a house. Then begin reading the story.
- As you read the story, ask students how each bird determines that a particular house is perfect for him or her. On pages 8-9, Spike discovers a house he likes. Why does he think it would be perfect for him? On pages 12-13, Queenie spies a house she likes. Why is the house perfect for her?

- On pages 16-17, Goldie spots a cute house. Why is it perfect for her? On pages 20-21, Fidget finds a house he likes. Why is it perfect for him?
- Near the close of the story, Birdie loses hope of ever finding a house for himself. What do his friends do to make sure he has a house that fits him perfectly?

When you have finished reading the book to students, continue with the remainder of the session.

Session 3: *How much do containers hold?*

Remind students that in previous sessions they compared the capacities of their hands and their shoes. What they found is that the capacities of some hands and shoes were the same, while the capacities of others were different. This session introduces the notion that we can measure the capacities of various containers. Reading *Room for Ripley* aloud to the class will help with this introduction.

Room for Ripley Stuart J. Murphy

Carlos visits a pet store daily to look at fish and falls in love with a guppy he names Ripley. Before he can take the fish home, though, he has to obtain a container of the appropriate size. Carlos learns about measures of capacity as he finds out just how much water it takes to make room for Ripley.

- Discuss the pictures on pages 4-5. Ask students what is happening in those pictures. Why does Carlos name his favorite fish “Ripley?”
- Carlos’s sister Ana gives him a fish bowl she had used earlier. How does Carlos plan to determine how much water Ripley will need in the bowl?
- After each addition of water, ask students, “How much water is in the bowl now? Do you think that will be enough?”
- Finally, Carlos buys live plants for the fish bowl before going back the next day to buy Ripley. What does he discover after putting the plants in the container? How much total water will Ripley have in his bowl? (p. 22)

After discussing the story, continue with the remainder of the session.

BUILDING LANGUAGE FOR LITERACY

1. Re-read *The Ant and the Elephant* to students. Use the re-reading as an opportunity to practice using the format of sentence frames to compare the animals in the story. This will help students learn to communicate clearly when making comparisons. For instance, after the ant encounters the turtle, ask the students to tell you how these two animals compare in *size*. For example, “The turtle is *bigger* than

the ant.” As another example, you could ask students to compare animals in terms of *weight*. For instance, “The elephant is *heavier* than the ant.”

Continue the sentence frame pattern with a few more of the animal pairings. Try to cover comparisons of *length*, *height*, *size* [smaller, bigger], and *weight*.

2. Show students pages 22-23 of *Room for Ripley*. This page features liquid measures and equivalencies. Ask students to use the following sentence frame to state equivalencies:

(Number of units) equals (number of units).

For example, 16 cups equals 1 gallon. OR 2 pints equals 1 quart.

3. Consider telling students the story of *Goldilocks and the Three Bears*, or read a copy of the story from your school library. Size and capacity comparisons are the hallmarks of this tale. Pause periodically throughout the story to ask students to use complete sentences to make comparisons between the size of the chairs, beds, and porridge bowls for Baby Bear, Mama Bear, and Papa Bear. For example, “Baby Bear’s porridge bowl is smaller than Mama Bear’s bowl.”

UNIT 2: MOTION AND FORCES

Motion is everywhere around us. Even something like a building that does not appear to be moving is really in motion. On a miniscule scale, electrons are in perpetual motion, traveling around the nuclei of atoms. On a scale of the unimaginably huge, the universe is continuously expanding outward.

Because movement is all around us, students intuitively understand motion. The goal in this unit is for students to begin to learn about motion on a more formal scientific level. In this unit, students start from an understanding that if they get up from their seats and walk to the door, they have *moved*. Next, they learn that the path from one point to another is called *distance* and distance has a *direction*. Finally, they realize that in order for an object to change its motion or direction, a force needs to be applied. Motion is intimately related to forces.

In this unit, children’s literature and nonfiction selections are helpful tools in reinforcing or supplementing students’ understanding of motion and speed. Texts that focus on movement, measuring distance, and speed are appropriate. So are selections that speak to what influences the motion of objects, especially pushing and pulling.

The titles listed below fit the criteria for inclusion in this unit.

RECOMMENDED LITERATURE

Recommended titles are listed below, along with their authors and Lexile ratings. The list is followed by suggested strategies for incorporating the books into the unit’s science lessons. You may wish to select additional books that help students understand the concepts.

LESSON NUMBER	TITLE	AUTHOR	LEXILE LEVEL
2.1 Distance and Motion	<i>Inch by Inch</i>	Leo Lionni	210L
	<i>The Fastest Animals</i>	Catherine Ipcizade	400L
2.2 Forces and Motion	<i>Oscar and the Cricket</i>	Geoff Waring	AD620L
	<i>Push and Pull</i>	Patricia J. Murphy	480L
	<i>Pushing and Pulling</i>	Natalie Hyde	540L

Lesson 2.1 Distance and Motion

PURPOSE

This lesson develops the concept that the motion of an object can be described by the distance it has moved from its initial position to its final position. Students will then relate the time necessary to cover a fixed distance to the speed of the object.

OBJECTIVES

By the end of the lesson, students will be able to:

- Measure the distance that an object has traveled
- Compare the speeds of two objects using a stopwatch
- Analyze a bar diagram

EMBEDDING LITERACY

Session 2: *How do we measure the distance traveled?*

The theme of this session is measuring distance traveled. Before launching into the concept, read *Inch by Inch* aloud to students.

Inch by Inch
Leo Lionni

A clever little inchworm is proud of his ability to measure anything under the sun. He uses his own body as a unit of measure. The worm starts from an initial position, for example a bird's tail, and then moves all the way to the final position, perhaps the bird's head. From a robin's tail to a toucan's beak, nothing challenges his measurement skills! One day, however, a hungry nightingale threatens to eat him unless he measures her song. But the clever little inchworm has a solution for the dilemma.

Before reading the story, invite the class to look at the book's cover. Ask them to find the inchworm and describe its looks. The inchworm seems to live among plants and grasses. How might this be protection for him?

Begin reading the book, and ask the following questions:

- What body parts of other birds does the inchworm measure? Ask students to point out where on each bird the inchworm begins to move (initial position) and where he ends his movement (final position).
- How does the nightingale threaten the inchworm?
- What clever action does the inchworm take to trick the nightingale and escape with his life?
- Do you think the inchworm is a standard measurement tool or a nonstandard one? Explain your answer.

Session 3: *How fast?*

In this session, students will measure whether something is going faster or slower than something else. In preparation for measuring speed, share with students *The Fastest Animals*.

The Fastest Animals

Catherine Ipcizade

The world of animals is full of surprises! In this book students learn about the fastest animals in the world.

- Show students the cover of the book. What seems to be happening? Then read the title of the book. Ask students what they think the book will be about.
- Tell students that this is a nonfiction book. That means it is not a made-up story. Instead, it is a book that gives the reader facts, in this case about very fast animals.
- Show students the Table of Contents and discuss what it means. Guide them to understand that the first chapter will be about “fast” animals, the second about “faster” animals, and the third about “fastest” animals.
- Start reading the book. Ask them to identify the animal in the picture on page 5. Alert them to listen for the length of this animal. How fast is it?
- Call students’ attention to the green line at the bottom of the page with the orange figure of a whale at the left-hand side. We usually get information from pictures and words. What information does the green line give us?
- Discuss the information about the lion. When does a lion move fast? Direct students to the green line at the bottom of the page. What information does it provide?
- Read the information about the ostrich, and ask students what surprised them about the ostrich.
- Read aloud the information about “faster” animals and discuss the facts with students. For each animal, have students look at the bar graph at the bottom of the page.
- Read aloud the information about the “fastest” animals and discuss the facts with students. Direct their attention to the green line and animal silhouettes at the bottom of the page. Ask students to look at the line and come up with comparative examples. For instance, “The ostrich is faster than the whale.”
- If desired, point to the glossary and index and talk about what information can be found in those sections.

Lesson 2.2 Forces and Motion

PURPOSE

This lesson centers on the relationship between force and motion. A force is a push or pull that gets something moving or stops something that is already in motion. An object that is at rest will stay at rest until a push or pull moves it. In this lesson, students will experience contact forces, classify forces as pushes or pulls, discover that heavier objects require more force to move, and realize that objects thrown with more force will travel a greater distance.

OBJECTIVES

By the end of the lesson, students will be able to:

- Differentiate between pushes and pulls
- Make predictions about the application of a force
- Measure and record on a chart the distance a thrown object travels
- Analyze data and draw conclusions about the effect of applying more or less force when throwing an object
- Relate the change of speed or direction of motion to the action of a force

EMBEDDING LITERACY

Session 1: *What's a push? What's a pull?*

Introduce the concept of “What makes things move?” by reading *Oscar and the Cricket* aloud to the class.

Oscar and the Cricket: A Book about Moving and Rolling

Geoff Waring

Oscar is a kitten who has a lot of questions about how things move and roll. His friend Cricket knows the answers and shows Oscar how objects start moving and change direction, and how animals use their muscles to move.

Before reading the story, make and display a chart with 3 columns: *Getting Going*, *Keeping Going*, *Stopping*. Tell students that they will learn facts about motion as they listen to *Oscar and the Cricket*.

- Begin reading the story and stop at page 9. Ask students what they have learned about motion from looking at the pictures and listening to the words. Enter what they have learned in the appropriate column on the chart.
- Stop at each set of pages, continuing to elicit what students have learned and entering the learning on the chart.

- After you have finished the book, ask students to look at the chart and discuss what they have learned. Then continue with the remainder of the session.

At the conclusion of **Session 1**, use *Push and Pull* to review the concepts of *push* and *pull* as forces that initiate motion. Ideally, this review will take place in small groups. While one group reviews the material (with or without your assistance), the other groups can be engaged in center activities.

Push and Pull
Patricia J. Murphy

Push and Pull is a nonfiction book that features colorful photos and simple text to teach children about forces and how they affect the movement of objects.

Tell students that this book consists of photographs about motion. They will look at each picture and decide whether it shows *pushing*, *pulling*, or *both*. Ask them to provide evidence for their answers.

The following title is for more advanced readers, and might be used during center time.

Pushing and Pulling
Natalie Hyde

How do you move objects from one position to another? This fun book explains how a force, such as a push or a pull, can put an object in motion. Simple activities show how a force can move an object that is not moving or stop one that is.

This non-fiction book explores pushes and pulls as forces that propel motion. On page 25, there is an activity that encourages students to become “Force Detectives” as they learn more about the concept.

LIFE SCIENCE

UNIT 1: OUR SENSATIONAL SENSES

Senses allow organisms to gather information about their surroundings. This information can be helpful for locating food, water, or mates. Input from senses can also help an organism find shelter or avoid danger. Each sense corresponds to a specific physical structure, or body part. Information gathered with one or more senses can be processed and classified.

The titles listed below fit the criteria for inclusion in this unit.

RECOMMENDED LITERATURE

Recommended titles are listed below, along with their authors and Lexile ratings. The list is followed by suggested strategies for incorporating the books into the unit's science lessons. You may wish to select additional books that help students understand the concepts.

LESSON NUMBER	TITLE	AUTHOR	LEXILE LEVEL
1.1 Our Sensational Senses	<i>Brown Bear, Brown Bear, What Do You See?</i>	Bill Martin, Jr.	200L
	<i>My Five Senses</i>	Aliki	490L
	<i>Our Eyes Can See</i>	Jodi Lyn Wheeler-Toppen	250L
	<i>Our Skin Can Touch</i>	Jodi Lyn Wheeler-Toppen	230L
	<i>The Listening Walk</i>	Paul Showers	480L
	<i>Our Ears Can Hear</i>	Jodi Lyn Wheeler-Toppen	260L
	<i>Our Noses Can Smell</i>	Jodi Lyn Wheeler-Toppen	250L
	<i>Our Mouths Can Taste</i>	Jodi Lyn Wheeler-Toppen	220L

Lesson 1.1 Our Sensational Senses

PURPOSE

Senses allow organisms to gather information about their surroundings. This information can be helpful for locating food, water, or mates. Input from senses can also help an organism find shelter or avoid danger. The purpose of this lesson is for students to associate each sense with its corresponding physical structure, or body part, and to process and classify information gathered with one or more senses.

OBJECTIVES

By the end of this lesson, students will be able to:

- Identify each sense and associate it with the corresponding body part
- Use senses to identify properties of objects and then classify the objects

EMBEDDING LITERACY

Session 1: *How does your sense of sight help you learn about the world?*

Introduce the sense of sight with a game of “I Spy.” Before moving on to the attribute block activity, introduce the story, ***Brown Bear, Brown Bear, What Do You See?***

Brown Bear, Brown Bear, What Do You See?

Bill Martin, Jr.

In this classic children’s story **Brown Bear** watches as animals of different colors walk by. The bear uses his eyes/sense of sight to observe what is around him.

- Read the story aloud, stopping as needed to review colors and animal names. Review the word **see** from the “*See with your eyes*” *Sensory Poster*.

Continue with the rest of the session.

At another time, read ***Our Eyes Can See*** to review the sense of sight and ***My Five Senses*** to review each sense.

Our Eyes Can See

Jodi Lyn Wheeler-Toppen

Sight is one of the five senses. Our eyes let us see. Simple, fun text teaches readers about the sense of vision and how the eyes let us see.

My Five Senses

Aliki

In another classic story, Aliki shows how familiar objects in the students’ world is experienced with their five senses.

Session 2: *How does your sense of touch help you learn about the world?*

In this session, students participate in an activity where they are asked to identify the shape of an attribute block using their sense of touch only.

At some point in the day, read ***Our Skin Can Touch***.

Our Skin Can Touch
Jodi Lyn Wheeler-Toppen

Touch is one of the five senses. Our hands let us feel. Simple, fun text teaches readers about the sense of touch and how the skin lets us feel.

- As you read, point out how the illustrations and text support each other. Review the word **touch** from the “Touch with your Skin” *Sensory Poster*.

Session 3: *How does your sense of hearing help you learn about the world?*

Begin Session 3 by reading ***The Listening Walk***.

The Listening Walk
Paul Showers

A girl takes a walk to explore her surroundings. As she walks, she listens carefully to what is all around her.

- Before beginning to read, show students the cover of the book and ask them where they think the story takes place. Have them provide evidence for their answers.
- Read the book. As you read, ask the same question at various points: “**How did the girl in the story hear all the sounds she did?**” [She listened carefully.]

Continue with the rest of the session.

At another time, read the book ***Our Ears Can Hear***.

Our Ears Can Hear
Jodi Lyn Wheeler-Toppen

Hearing is one of the five senses. Our ears let us hear. Simple, fun text teaches readers about the sense of hearing and how the ears let us hear.

- As you read, point out how the illustrations and text support each other. Review the word **hear** from the “Hear with your ears” *Sensory Poster*.

Session 4: *How does your sense of smell help you learn about the world?*

In this session students identify familiar mystery smells. At some point in the day, read, ***Our Noses Can Smell***.

Our Noses Can Smell
Jodi Lyn Wheeler-Toppen

Smell is one of the five senses. Our nose lets us smell. Simple, fun text teaches readers about the sense of smell and how the nose lets us smell.

- As you read, point out how the illustrations and text support each other. Review the word **smell** from the pocket chart and display the “*Smell with your Nose*” ***Sensory Poster***.

Session 5: *How does your sense of taste help you learn about the world?*

In this session, students learn how their tongue helps them learn about their world through taste. At some other time in the day, read ***Our Mouths Can Taste***.

Our Mouths Can Taste by Jodi Lyn Wheeler-Toppen

Taste is one of the five senses. Our mouth and tongue let us taste. Simple, fun text teaches readers about the sense of taste and how the mouth and tongue let us taste.

- As you read, point out how the illustrations and text support each other. Review the word **taste** from the “*Taste with your Tongue*” ***Sensory Poster***.

Session 6: *Culminating Activities*

Remind students that in previous sessions they learned about their senses, the parts of the body associated with that sense, and used their senses to observe and compare familiar objects.

One way for students to review what they’ve learned is to create a ***My Five Sensational Senses*** book. They can illustrate the book with digital camera pictures, clipart, or their own drawings. Use the following sentence frames on the pages to write in the name of the object. Students may then share one or more pages with their classmates.

- I see _____ with my eyes.
- I touch _____ with my hands.
- I hear _____ with my ears.
- I smell _____ with my nose.
- I taste _____ with my tongue.

UNIT 2: LIVING THINGS

Living things have similar characteristics that distinguish them from nonliving things. All living things have certain basic needs that are necessary for them to survive, grow, and reproduce.

Plants need water, light, air, and nutrients to live and grow. Plants are different from animals because they are able to manufacture their own food using physical structures specialized for that purpose: roots, stems, leaves, and flowers. Plants are able to survival in many different types of habitats using these specialized physical structures. Other living things, including humans, depend on plants for their survival.

Animals also have certain basic needs that must be met for survival: nutrients (food), water, air, adequate shelter or space, and acceptable body temperature. A habitat is a place where living things can get everything they need to survive. Animals have external body parts and coverings that make it possible for them to survive in their own specific habitat.

Humans depend on both plants and animals and use natural resources to meet their basic needs. Humans can impact the environment in helpful or harmful ways. It is never too early to teach students about their dependence on Earth's resources and how they can make a difference in the quality of their natural environment though simple choices. Recycling is one step humans can take to help conserve resources.

The titles listed below fit the criteria for inclusion in this unit.

RECOMMENDED LITERATURE

Recommended titles are listed below, along with their authors and Lexile ratings. The list is followed by suggested strategies for incorporating the books into the unit's science lessons.

LESSON NUMBER	TITLE	AUTHOR	LEXILE LEVEL
2.1 <i>Is it Alive?</i>	<i>Is It Alive?</i> (Big Book)	Marcia S. Freeman/ Newbridge Educational	400L
	<i>Why Living Things Need... Food Water Air</i>	Daniel Nunn	250L (all)
2.2 Plants and Their Basic Needs	<i>Seeds</i>	Vijaya Khisty Bodach	370L
	<i>A Sunflower's Life</i>	Nancy Dickmann	260L

	Learning About Plants	Catherine Veitch	NP
	How Do Plants Grow?	Julie K. Lundgren	450L
	Living and Nonliving in the....	Rebecca Rissman	380L
	Desert		360L
	Ocean		360L
	Grasslands		360L
	Rainforest		400L
	Polar Regions		
	A World of Farming: Farms Around the World	Catherine Veitch	500L
2.3 Animals and Their Basic Needs	Animals and Their Babies (Big Book)	Melvin Berger / Newbridge Educational	225L
	A Penguin's Life	Nancy Dickmann	260L
	Let's Classify Animals!	Kelli L. Hicks	600L
	Why Living Things Need...	Daniel Nunn	250L (all)
	Food		
	Water		
	Air		
	Homes		
	Living and Nonliving in the....	Rebecca Rissman	380L
	Desert		360L
	Ocean		360L
	Grasslands		360L
	Rainforest		360L
	Polar Regions		400L
	A World of Farming: Farms Around the World	Catherine Veitch	500L

Lesson 2.1 Is It Alive?

PURPOSE

Living things have similar characteristics that distinguish them from nonliving things. All living things have certain basic needs that are necessary for them to survive, grow, and reproduce. The purpose of this lesson is for students to learn the differences between living and nonliving things and to compare the basic needs of plants and animals.

OBJECTIVES

By the end of this lesson, students will be able to:

- Develop criteria to distinguish between living and non-living things
- Identify basic needs of all living things
- Compare basic needs of plants and animals
- Develop criteria for distinguishing between plants and animals using observable traits

EMBEDDING LITERACY

Session 2: *What are the characteristics of all living things?*

In this session, students generate criteria to differentiate between living and nonliving things. At some point in the day, introduce the *Is it Alive?* Big Book.

Is it Alive?

Macia S. Freeman / Newbridge Educational

With colorful pictures, this book introduces youngsters to the concepts of living and nonliving, and how to determine if something is living or nonliving.

- Read the big book, stopping to briefly discuss each picture and what criteria students may have used to determine if it is living or nonliving. Point out that this is an example of informational text and show how illustrations support the text. Some students may have the misconception that plants do not move by themselves. Clarify that they are not able to move from place to place like a person or other animal does, but that they do turn toward a light source. You can demonstrate this easily with any classroom plant.

Session 3: *What are the basic needs of plants and animals?*

In this session students learn about basic needs of all living things. At some point in the day, read the book, *Why Living Things Need Food*.

Why Living Things Need Food

Daniel Nunn

This book uses simple, predictable text to introduce students to why food is a basic need for all living things.

- Read the book, stopping to discuss as needed. The concept of plants making their own food may be difficult to understand at first. Understanding the process is not necessary at this point; only knowing that plants use certain natural resources, or “ingredients” to make their own food because they cannot move from place to place to obtain food.

Note: Three other titles are included in the *Why Living Things Need* series: *Water*, *Air*, and *Homes*. All are written at Guided Reading Level H/Lexile 250. Read the rest of these titles at other times during the day. You may have more advanced readers that can read them independently or with a partner. These books will be revisited in *Lesson 2.3 Animals and Their Basic Needs*.

Lesson 2.2 Plants and Their Basic Needs

PURPOSE

All living things have certain basic needs that are necessary for them to survive, grow, and reproduce. Plants need water, light, air, and nutrients to live and grow. Plants are different from animals because they are able to manufacture their own food using physical structures specialized for that purpose: roots, stems, leaves, and flowers. Plants are able to survival in many different types of habitats using these specialized physical structures. The purpose of this lesson is for students to explore how plants meet their basic needs for survival and how other living things, specifically humans, depend on plants for their survival.

OBJECTIVES

By the end of this lesson, students will be able to:

- Describe basic needs for plant growth and survival
- Identify observable physical structures of plants and their functions
- Explore seeds and explain their role in plant survival
- Compare different plant habitats
- Describe how plants can change their habitats
- Explore the relationship between humans and plants

EMBEDDING LITERACY

Session 2: *How can we plant a mini-garden?*

In this session students continue their study of seeds by planting a mini-garden. At some point in the day, read any or all or the following: *Seeds*, or *A Sunflower's Life*, or *Learning About Plants*.

Seeds

Vijaya Khisty Bodach

This book with simple text and detailed close-up photographs introduces seeds, how seeds grow, and different types of seeds.

A Sunflower's Life

Nancy Dickmann

This title explores the different parts of a sunflower, and follows the stages of the flower's development from seed to growth to reproduction. The farming of sunflowers is also discussed.

Learning About Plants

Catherine Veitch

This picture book contains labeled photographs of several familiar plants. The labels show plant structures that vary with each photograph.

- As you read, take time to talk about the illustrations/photographs and how they support the text.

Session 3: *What are the parts of a plant?*

In this session, students learn about plant parts. At some point in the day, read ***How Do Plants Grow?***

How Do Plants Grow?

Julie K. Lundgren

This title presents the basic needs of plants, along with the physical structures of plants and how each structure helps the plant to grow and survive.

- As you read, take time to talk about the illustrations/photographs and how they support the text. Point out the use of captions and labeled diagrams.

Session 4: *Do plants grow in different habitats?*

In this session, students explore the idea of plants growing in different habitats through photographs of plants and discussion.

Read one (or more) of the following: ***Living and Nonliving in the... Desert; Ocean; Grasslands; Rainforest; Polar Regions.***

Living and Nonliving in the... Desert; Ocean; Grasslands; Rainforest; Polar Regions

Rebecca Rissman

These books address several different types of habitats and their living and nonliving elements, including plants and animals. The texts are short and can be read in just a few minutes.

- Point out how illustrations support text, including recurring vocabulary words in **bold** print.

Session 6: *How do people use plants?*

In this session, students explore plant products that people use. Read ***A World of Farming: Farms Around the World***.

A World of Farming: Farms Around the World

Catherine Veitch

Farms around the world have different animals, plants, and activities, but they all serve the same purpose, which is to provide food and products for people. This book contains colorful, labeled photos and simple text.

- As you read, emphasize the correct terminology that some farms *grow plants* and some *raise animals*. Some products are used as-is by people, while some are changed.

Lesson 2.3 Animals and Their Basic Needs

PURPOSE

All living things have certain basic needs that are necessary for them to survive, grow, and reproduce. Plants need water, light, air, and nutrients to live and grow. Plants are different from animals because they are able to manufacture their own food using physical structures specialized for that purpose: roots, stems, leaves, and flowers. Plants are able to survival in many different types of habitats using these specialized physical structures. The purpose of this lesson is for students to explore how plants meet their basic needs for survival and how other living things, specifically humans, depend on plants for their survival.

OBJECTIVES

By the end of this lesson, students will be able to:

- Describe basic needs necessary for animal growth and survival
- Recognize that some animals care for the basic needs of their offspring and some do not
- Explain how an animal’s external physical structures contribute to its survival
- Compare animals that live in different habitats
- Explore the relationship between humans and animals

EMBEDDING LITERACY

Session 1: *How do young animals meet their basic needs?*

In this session, students make the connection between basic needs of animals and how “baby animals” meet their basic needs.

Read the *Animals and Their Babies* Big Book. Preview the cover, which shows zebra parents and offspring.

Animals and Their Babies

Melvin Berger

This big book uses simple text to show how some animals care for their offspring.

- As you read, take time to talk about the illustrations/photographs and demonstrate how they support the text. The different color borders on each page spread show related ideas.

At another time, read *A Penguin’s Life*.

A Penguin's Life
Nancy Dickmann

Penguins are unique because both parents care for the egg and then the young. In this fascinating life cycle book, read about how a penguin's life begins and how it grows.

Session 2: *What are some ways animals can be grouped?*

This session introduces the idea of animal classification using plastic animals by observable traits. Read ***Let's Classify Animals!***.

Let's Classify Animals!
Kelli L. Hicks

This text is written for upper elementary, but is still a good introduction to the concept of animal classification.

- Since the text is written for upper elementary, make sure to preview the book and paraphrase text as needed. The idea is to expose students to the idea that, although all animals have the same basic needs, their specific needs differ based on what type of animal they are.

Session 3-4: *How do animals use senses to meet basic needs?*

This session reviews the concept of senses from ***Lesson 1.1 Our Sensational Senses***, and makes the connection between human senses and animal senses. At some point over the two sessions, reinforce the basic needs of animals by rereading the ***Why Living Things Need*** series.

Why Living Things Need... Food; Water; Air; Homes
by Daniel Nunn

These books use simple, predictable text to introduce students to the basic needs of all living things.

Each title is written at Guided Reading Level H/Lexile 250. You may have more advanced readers that can read them independently or with a partner.

Session 5: *How do animals live in different habitats?*

In this session, students explore where they think animals might live, based on observable characteristics. At some point, reread one (or more) of the following: ***Living and Nonliving in the... Desert; Ocean; Grasslands; Rainforest; Polar Regions.***

***Living and Nonliving in the...
Desert; Ocean; Grasslands; Rainforest; Polar Regions***

Rebecca Rissman

These books address several different types of habitats and their living and nonliving elements, including plants and animals. The texts are short and can be read in just a few minutes.

- As you reread these texts, focus on the animals and how their bodies and external structures help them live in that specific habitat.

Session 7: *How do people depend on animals?*

During this session, students again sort the plastic animals to determine which animals might live on a farm. The session goes on to identify products that humans use that are provided by animals. You might want to reread ***A World of Farming: Farms Around the World*** from Lesson 2.2.

A World of Farming: Farms Around the World

Catherine Veitch

Farms around the world have different animals, plants, and activities, but they all serve the same purpose, which is to provide food and products for people. This book contains colorful, labeled photos and simple text.

- As you read, emphasize that some farms *grow plants* and some *raise animals*. Some products are used as-is by people, while some are changed.

EARTH AND SPACE SCIENCE

UNIT 1: WEATHER

Weather is a constant in everyone’s life. Weather affects everything from what we decide to wear in the morning when we get up to what safety measures we should take when severe storms are brewing. Weather is the state of the atmosphere at a particular time and place—the temperature, wind, air pressure, humidity, and precipitation. Meteorologists analyze these factors and make weather forecasts.

Children’s literature plays a role in engaging students in the study of weather. Various titles introduce, summarize, supplement, or reinforce weather concepts. Books that work well for this unit include those that focus on how people dress for various weather conditions, the work meteorologists do, and how to keep safe during significant weather events, such as snowstorms.

The titles listed below fit the criteria for inclusion in this unit.

RECOMMENDED LITERATURE

Recommended titles are listed below, along with their authors and Lexile ratings. The list is followed by suggested strategies for incorporating the books into the unit’s science lessons. You may wish to select additional books that help students understand the concepts.

LESSON NUMBER	TITLE	AUTHOR	LEXILE LEVEL
1.1 Weather Watching	<i>Maisy’s Wonderful Weather Book</i>	Lucy Cousins	N/A
1.2 Stormy Weather Ahead!	<i>What is Weather?</i>	Robin Johnson	680L
	<i>Blizzard</i>	John Rocco	AD 570L
	<i>Blackout</i>	John Rocco	BR

Lesson 1.1 Weather Watching

PURPOSE

Weather is one of the easiest aspects of nature to observe. People use weather observations to make decisions about clothing and activities every day. The purpose of this lesson is to introduce some fundamentals of weather, such as types of precipitation, relative temperature, clouds, and wind. Students will learn terminology to communicate observations about weather.

OBJECTIVES

By the end of the lesson, students will be able to:

- Describe ways that weather influences human behavior
- Observe and describe weather conditions including temperature, wind speed, precipitation, and sky conditions
- Record daily observations of general weather conditions
- Analyze weather over time to identify patterns

EMBEDDING LITERACY

Session 2: *What is temperature?*

After students have recorded today's weather on the classroom chart as well as in their own weather journals, gather the students around you to read the following book.

Maisy's Wonderful Weather Book
Lucy Cousins

No matter what the weather is outside, Maisy can find ways to have fun in all kinds of atmospheric conditions. Readers can lift flaps and pull tabs to explore various aspects of the weather.

Before reading, turn the dial on the cover of ***Maisy's Wonderful Weather Book*** to show the sunshine. Then read the whole book to the class, perhaps letting volunteers pull tabs and lift flaps.

Revisit the first two pages where the sun is shining brightly and Maisy changes into her swimsuit. Ask students to infer what the temperature is (how hot or cold the air feels) when we wear our swimsuits and the sun is shining as it is in the book.

Ask students, **“What would you wear on a really hot day? What would you wear on a cold day?”** Allow students to share their ideas. Encourage them to be specific and to listen and build on what other students have shared. Begin a discussion about the differences in appropriate clothing for “hot” days (shorts, t-shirts, sleeveless shirts, sun hats, flip flops) and “cold” days (coats, hats, mittens, gloves, scarves, boots).

Proceed with the rest of the session.

Session 3: *What is wind?*

After students have recorded the details of today’s weather on the class chart and their own weather journals, gather the students around you and turn the dial on the cover of *Maisy’s Wonderful Weather Book* to show the wind. Revisit the page where the wind (moving air) blows the leaves as well as Maisy’s hat and kite. Ask students to infer from the picture whether the wind is blowing quickly or slowly. Ask them to describe other things that blow in the wind when it is blowing strongly.

Proceed with the rest of the session.

Session 4: *What is precipitation?*

After students have recorded the details of today’s weather on the class chart and in their own weather journals, gather the students around you and turn the dial on *Maisy’s Wonderful Weather Book* to show snow. Revisit the “snowy day” and “rainy day” pages. Explain that snow and rain are called precipitation, which is water or snow that falls from the sky. Ask, “**How are rain and snow different? How are they the same?**” Listen to students’ responses and guide them to understand that snow is water in frozen form.

Proceed with the rest of the session.

Session 5: *What can clouds tell us about the weather?*

After students have recorded the details of today’s weather on the class chart and in their own weather journals, gather the students around you and turn the dial of *Maisy’s Wonderful Weather Book* to show the rain cloud. Revisit the “rainy day” page where Maisy is jumping in a puddle. Ask students to explain why Maisy is wearing boots and carrying an umbrella.

Then turn to the “stormy day” page where Maisy is watching a thunderstorm from the couch. Ask students to compare the clouds in the two pictures. Ask, “**Do the clouds that make light rain look the same as the clouds that make lightning and heavy rain? How are they the same? How are they different?**” Guide students to recognize that darker clouds mean heavier rain and sometimes lightning.

Proceed with the rest of the session.

BUILDING LANGUAGE FOR LITERACY

Ask students to pick their favorite kind of weather day—sunny, rainy, windy, or snowy—and construct one sentence to explain why it is their favorite. For example: *My favorite kind of weather is a snowy day because I can ride my sled down hills.* Have students share their sentences aloud with the class.

Lesson 1.2 Stormy Weather Ahead!

PURPOSE

In the previous lesson, students learned about the basic components of weather. They collected weather data and observed patterns. Meteorologists use their knowledge of weather components and patterns to predict weather. Sometimes weather can be severe and potentially dangerous. In this lesson, students learn how meteorologists use their knowledge of weather patterns to predict weather. They are introduced to types of severe weather, and learn steps that their families can take to prepare and stay safe in such weather.

OBJECTIVES

By the end of the lesson, students will be able to:

- Understand how a meteorologist (weather forecaster) makes predictions from observed patterns
- Describe at least two kinds of severe weather
- Explain what steps families should take to prepare for severe weather

EMBEDDING LITERACY

Session 1: *How can we predict weather?*

At the conclusion of the session, read parts of *What is Weather?* to review concepts taught in the lesson.

What is Weather?

Robin Johnson

This book answers the question the title asks! It discusses the components of weather, the task of a meteorologist, how to chart the weather in order to make predictions, and more.

- Read pages 4-6 to the class. After reading the excerpt, ask students to construct a definition of weather.
- Read pages 12-13 on the role of the meteorologist. Then ask students to answer the question at the bottom of page 12.
- Read pages 20-21. Page 20 is a calendar that contains information about weather for each day of the month. Ask students if it shows that weather changes over time. On page 21 is a tally chart derived from the data on the weather calendar. Ask students what kind of weather occurred the most. What kind of weather occurred the least?

Session 2: *How can we be safe during a thunderstorm?*

The conclusion of the lesson calls for an explanation of two other types of severe weather: heat waves and snowstorms. The following book is about a special kind of snowstorm called a *blizzard*.

Blizzard
John Rocco

This book features the blizzard of 1978 in the northeastern United States. The perspective is that of the author who, as young boy, saw “nearly four feet of snow fall from the sky.” The pages of this book describe his experience.

- Read the story and share the pictures until you reach the foldout pages that map the young boy’s journey to town. Before looking at the map with students, ask them what the children’s attitude was at the onset of the snow. Did that mood stay the same, or did it change? If so, why?
- Open up the foldout pages and with the class, follow the boy’s journey from his home to the store. How did he manage to make his way through the snow? How did he help his neighbors?
- What was the boy’s “reward” when he returned home? Do you think your parents would have let you make the journey the young boy did?
- What finally clears away enough snow so kids can return to school?
- Ask students how this story might have been different had a meteorologist predicted a blizzard before students went to school on Monday.

Session 3: *How can we prepare for severe weather?*

After the discussion of power outages and when they might occur, read *Blackout* to give students the flavor of one.

Blackout
John Rocco

It is summer, and the city is hot and noisy and busy. Then the lights go out! What do families do when this kind of thing happens?

- Begin reading the book to students. Stop after the lights go out. Ask the class why they think the word MOM! is in such big letters.
- Continue to read until you reach the page where the dad is making shadow animals on the wall. Does it look like the kids are entertained?
- Continue to read until the family is on the rooftop. What kind of light do they discover? What else do they discover?
- Continue to read until the family reaches the street. What is happening there?

- Turn to the picture of the family sitting on the front stoop and eating ice cream. What (from the child’s point of view) is good about this moment?
- What happens when the lights come back on? How do you think the youngster feels about everything going “back to normal?” What is the family doing on the last page of the book?
- Ask the class, “**Do you think the family is practicing safe behavior when the lights go out? Why or why not?**”

BUILDING LANGUAGE FOR LITERACY

A blizzard is a severe cold weather event. Challenge the students to think of as many words as they can that mean *cold* (for instance, *frosty*, *chilly*, and so on). Chart their suggestions.

UNIT 2: SUNLIGHT AND ENERGY

Sunlight affects both the living and nonliving components of the Earth. It drives the water cycle and heats Earth's surface, which makes life possible. Not all surfaces heat up or retain heat in the same way. Children's literature plays a role in engaging students in the topics of sunlight and energy.

The titles listed below fit the criteria for inclusion in this unit.

RECOMMENDED LITERATURE

Recommended titles are listed below, along with their authors and Lexile ratings. The list is followed by suggested strategies for incorporating the books into the unit's science lessons. You may wish to select additional books that help students understand the concepts.

LESSON NUMBER	TITLE	AUTHOR	LEXILE LEVEL
2.1 Sunlight and Energy	<i>Sunlight</i>	Erin Edison	410L

Lesson 2.1 Sunlight and Energy

PURPOSE

Earth is made up of both living and nonliving components. Living things include plants, animals, fungi, and bacteria. Nonliving components include sunlight/temperature, water, air, and Earth materials such as rocks, pebbles, and sand. Sunlight affects both living and nonliving components. It drives the water cycle and heats Earth's surface, which makes life possible. Not all surfaces heat up or retain heat in the same way. This lesson features an experiment that allows students to compare the heating properties of different surfaces and materials.

OBJECTIVES

By the end of the lesson, students will be able to:

- Describe that sunlight heats the Earth's surface
- Observe and compare heating properties of various materials
- Design and build a structure that will reduce the warming effect of sunlight on an area

EMBEDDING LITERACY

Session 1: *Why is the sun's energy important?*

After you have talked with students about what they already know about sun, light, and heat, and you have previewed the “We Love Sunlight” booklet, read the following book to them.

Sunlight
Erin Edison

Sunlight makes life on Earth possible. It warms the Earth, promotes the growth of plants, and heats the oceans. This slim volume with its colorful pictures emphasizes the importance of the sun to the Earth and to all growing things.

- Show students the cover of the book and ask them to predict what it will be about.
- Tell students that ***Sunlight*** is a nonfiction book that gives readers information or facts about sunlight. Turn to the “Table of Contents” and read the list of the four topics they will learn about in the book.
- Begin reading the book, stopping periodically to question students and point out how the pictures help readers understand the text. When you have finished reading, invite students to recall what they have learned about sunlight.

Proceed with the rest of the session.