



Knowing  
Science

3-DIMENSIONAL TEACHING & LEARNING

GRADE 2

# Literacy Guide





## GRADE 2

# Literacy Guide

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# Introduction

## Introduction to the *Knowing Science*<sup>®</sup> 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<sup>®</sup> 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:

<b>Description</b>	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>
<b>Comparison</b>	Discusses similarities and differences between two objects or ideas <i>same; both; different; unlike; similar to; also</i>
<b>Sequence, Order, or Procedural</b>	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>
<b>Cause and Effect (Before and After)</b>	What causes an event and the resulting change <i>because of; before; after; since; as a result of; however</i>
<b>Problem and Solution</b>	A problem or task to be solved is described along with possible solutions <i>problem; task; issue; answer; possible; solution; try</i>
<b>Fact and Opinion</b>	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

Measurement is comparison to a standard. In order to take a measurement, you need two things: a measuring tool and something to measure. Without measurement, the only means to determine if one object is longer, wider, heavier, and so on is side-by-side comparison. In many cases this is impractical. Comparison of an unknown with a fixed standard allows us to define physical quantities. Measuring tools use standard units that are arbitrarily chosen but universally agreed upon. Measurement is essential to the advancement of science and technology.

In second grade, students develop an increasingly refined understanding of measuring height/length/distance/ weight, and capacity/liquid. They also focus on measurement of temperature and become acquainted with more kinds of standard units.

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 measuring length, height, weight, capacity, and temperature. Other relevant titles are those that feature 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 How Long? How Far?	<i>How Big is a Foot?</i>	Rolf Myller	660L
	<i>How Long or How Wide?</i>	Brian P. Cleary	730L
1.2 Feeling the Difference: Weight	<i>How Do You Measure Weight?</i>	Thomas K. and Heather Adamson	NC 660L
	<i>Balancing Act</i>	Ellen Stoll Walsh	110L
	<i>On the Scale, a Weighty Tale</i>	Brian P. Cleary	780L
1.3 Measuring Capacity/Liquid Measurements	<i>How Do You Measure Liquids?</i>	Thomas K. and Heather Adamson	NC 660L
1.4 Measuring Temperature	<i>Measuring Temperature</i>	Darice Bailer	620L
	<i>Is It Hot or Cold?</i>	Carrie Stuart	430L

## Lesson 1.1 How Long? How Far?

### PURPOSE

Comparison is one of the “big ideas” of science. In first grade, students measured objects using direct comparison and nonstandard units of measurement before “graduating” to standard units (centimeters and inches). The purpose of this lesson is for second graders to continue to develop their understanding of linear measurement through nonstandard and standard units. Activities focus primarily on the metric system (centimeters and meters). This lesson also introduces the concept of estimation.

### OBJECTIVES

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

- Measure accurately using both nonstandard and standard units (cm/m) to measure the length of common objects.
- Compare and order three or more objects according to their length
- Describe the length of different objects using appropriate vocabulary
- Explain why a standard unit of measurement is more reliable than a nonstandard unit

### EMBEDDING LITERACY

#### Session 2: *What are hand spans?*

After students compare their hand sizes and affirm that not all people’s hands are the same size, read *How Big Is a Foot?* to them.

#### *How Big Is a Foot?*

Rolf Myller

The King wants to give his queen something very special for her birthday—a bed. However, no one knows how big the bed should be. The Queen’s birthday is only a few days away. How can they figure out what size the bed should be?

- Students may remember this book from first grade. As you read, ask comparing questions about the “feet” discussed in the story (the King’s foot versus the apprentice’s foot).
- Tell students, **“Before an actual measurement system was established, body parts were used to explain how long something was—hand spans, digits (the length of fingers), feet (as in feet on your body), and yards (from your nose to the end of your outstretched fingertips). Not everyone had the same size body parts, though, and that caused problems. King Henry I of England decided that measurement should**

**be done according to a ‘standard.’ He used *his* feet, arms, and hands as the standards that everyone had to use.”**

*Proceed with the remainder of the session.*

**Session 5:** *How do we use a tape measure?*

### ***How Long or How Wide? A Measuring Guide***

Brian P. Cleary

Cleary brings a sense of humor to all things measurement. His rhyming text offers funny examples of things to measure and covers measurement units, measurement tools, and customary and metric measurement.

Tell students that you will read them a book about measuring.

- Before beginning to read, have a brief class discussion about measurement. Why do people measure things? What sorts of things do they measure?
- Alert students to look/listen for their favorite illustration/example. Invite them to share their favorites after you have read the book.

*Distribute rulers to each pair of students and proceed with the remainder of the session.*

### **BUILDING LANGUAGE FOR LITERACY**

In his book ***How Long or How Wide?*** Brian P. Cleary takes a humorous approach to measurement. Ask students to write a 3-5 sentence paragraph for someone who knows nothing about measurement. Tell them to choose either a *foot* or a *meter*. They should define what that unit is, and give several examples of items that can usefully be measured using feet or meters. The paragraph does not have to be funny, but some students might want to be humorous in defining what a foot or a meter can measure.



## Lesson 1.2 Feeling the Difference: Weight

### PURPOSE

Comparison is one of the “big ideas” of science. In first grade, students began measuring weight by using direct comparisons and nonstandard units of measurement. Then teachers introduced them to standard units. The purpose of this lesson is for second graders to continue to develop an understanding of weight (heavier or lighter) using a balance, along with nonstandard and standard units of measurement. Activities focus primarily on the metric system (grams and kilograms).

### OBJECTIVES

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

- Measure accurately the weight of common objects using both nonstandard and standard units (grams)
- Compare and order three or more objects according to their weight
- Describe the weight of objects using appropriate vocabulary
- Explain why a standard unit of measurement is more reliable than a nonstandard unit

### EMBEDDING LITERACY

**Session 3:** *How does a balance compare gram masses?*

Begin the session by reading about measurements for weight.

***How Do You Measure Weight?***  
Thomas K. and Heather Adamson

This nonfiction, informational text discusses ways to measure weight using common objects, balances and scales, and metric and customary measurement units.

Introduce the session by reading pages 2-7 of ***How Do You Measure Weight?*** The focus here is on comparing the weight of two objects. Remind students that in the previous session they used nonstandard pompoms units to weigh and order objects. Today they will use wooden blocks.

*Proceed with the remainder of the lesson.*

#### **Session 4:** *How does a balance compare gram masses?*

After reminding students that plastic masses are for scientific measurement, not a new type of block, read aloud the book below that illustrates the principle of balance.

##### ***Balancing Act*** Ellen Stoll Walsh

This book uses simple text and charming drawings to illustrate how to balance weight on a teeter-totter. The book also stresses the virtues of ingenuity and cooperation.

- Read the book aloud to students, asking students what is happening in the pictures as you progress through the book. How do the pictures show whether the teeter-totter is balanced or unbalanced?
- How is the seesaw like and unlike a double pan balance?

Before modeling the use of plastic masses, you might want to review pages 8-11 of ***How Do You Measure Weight?***. These pages feature illustrations of plastic masses, speak to the metric system, and picture a young boy using a balance to measure an apple with gram weights.

#### **Session 6:** *Weight Measurement Assessment*

Before administering the *Weight Measurement Assessment*, read aloud to students another humorous book by Brian P. Cleary that can serve as a review on measuring weight.

##### ***On the Scale, A Weighty Tale*** Brian P. Cleary

This wacky book on weight is just the vehicle through which to review units of weight measurement. From grams to pounds to tons, Cleary uses silly rhymes to illustrate how to measure trucks, ducks, and more.

- Tell students to be prepared to write down any words they have learned to describe weight as you read the book. Then read the book without stopping. Upon completion, ask students what terms they recognized and what facts they associate with those terms.
- Ask students to recall the various measuring tools pictured in the book.

*Proceed with the remainder of the session.*

## Lesson 1.3 Measuring Capacity/Liquid Measurements

### PURPOSE

Comparison is one of the foundational “big ideas” of measurement in science. Developing an awareness and understanding of the concept of capacity is a simple form of classification essential to understanding measurement. In first grade, students explored capacity using nonstandard and customary units of measurement. The purpose of this lesson is for second graders to continue to develop the concept of capacity through nonstandard and standard units of measurement. In addition, they will learn about liquid measurement.

### OBJECTIVES

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

- Measure accurately the capacity of containers using both nonstandard and standard metric units (milliliters)
- Use nonstandard units to compare and order the relative capacity of various containers
- Describe the capacity of containers using comparative language such as more/greater/greatest, less/least, and equal
- Understand and explain the relationship between metric containers

### EMBEDDING LITERACY

**Session 1:** *How do we measure with graduated cylinders and beakers?*

At the beginning of the session, review what students learned in first grade about liquid measurement by rereading ***How Do You Measure Liquids?***

***How Do You Measure Liquids?***  
Thomas K. and Heather Adamson

This informational text uses colorful pictures and familiar experiences to present measurement tools for liquids. The book includes customary and metric measurement units.

Since students read this book in first grade, the information it provides should not be totally unfamiliar to students. As you read, have brief discussions based on student interest and questions.

*Proceed with the remainder of the session.*

## Lesson 1.4 Measuring Temperature

### PURPOSE

The purpose of this lesson is to introduce students to methods of measuring temperature.

### OBJECTIVES

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

- Explain how to measure temperature
- Describe situations in which they use thermometers in their daily lives

### EMBEDDING LITERACY

#### **Session 1:** *How do we read a thermometer?*

Begin the session by reading the following book about measuring temperature.

***Measuring Temperature***  
Darice Bailer

This book with its colorful photos and comic characters answers several questions about temperature. What is temperature? How do we measure it? What is a thermometer? What are Fahrenheit and Celsius? The text offers a straightforward introduction to measuring temperature.

After showing students the demonstration thermometer, read ***Measuring Temperature*** to them aloud.

- Read pages 4-5. Ask students to listen for what we use a thermometer for.
- Read page 6 and ask students what the word *thermometer* means.
- Read pages 8-9 and then ask students what two kinds of thermometers are described on these pages. Has anyone used either kind of thermometer?
- Read page 10 carefully and discuss with the students the unit for measuring heat.
- After reading the book, ask students to make a two-column chart with items students think are hot and cold. For instance, hot chocolate would go in the “hot” column, but an ice cube would fall in the “cold” column.
- Divide the students into pairs or small groups and have them brainstorm ideas until they have filled both sides of the chart. Then ask students to share their thinking with the whole group.

*Proceed with the remainder of the session.*

**Session 2:** *How does a thermometer measure temperature?*

After the opening discussion about students' recent experience with a thermometer and a quick look at the demonstration thermometer, read the following book on how to use a thermometer.

***Is It Hot or Cold?***

Carrie Stuart

This brief, easy-to-read book explains how thermometers work. It uses only the Fahrenheit scale but does a good job of explaining it.

Read the book aloud and show the pictures to the class. Then ask the following questions:

- How do the numbers on a thermometer help you know about the weather?
- How does a liquid thermometer work?
- How many uses for a thermometer can you think of?

*Proceed with the remainder of the session.*

**BUILDING LANGUAGE FOR LITERACY**

Divide the class into groups of 2-3. Ask each group to write a 3-5 sentence paragraph that explains why thermometers are important. After groups have finished, ask them to share their paragraphs with the rest of the class.



## UNIT 2: MATTER AND MATERIALS

Matter is defined as anything that has mass and takes up space. Everything you see around you (including you!) is made of matter. All objects are made up of one or more materials, such as wood, rock, metal, paper, and plastic. We can describe objects both in terms of the materials of which they are made and by their physical properties such as color, size, texture, weight, and so on.

Matter exists in different states—solid, liquid, and gas. Water exists in all three states: solid, liquid, and gas. Heating and cooling can change a solid, liquid, or gas from one state to another. Things can be done to some other materials that may change their properties.

In kindergarten, the curriculum introduced students to the idea that objects have attributes that make it possible for us to identify two entities as the same or different. In second grade, students move to a more sophisticated understanding of the definition of matter and the properties of materials. Visual examination of an object does not tell the whole story. We can also describe an object in terms of the materials from which it is made. Second-graders also conduct an experiment to see if matter can change.

Children’s literature plays a role in engaging students in the science of matter and materials. Various titles introduce, summarize, supplement, or reinforce the concepts in this unit. Books that work well for this unit include those that focus on the properties of matter, the three states of matter, and whether matter can change.

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	Title	Author	Lexile Level
2.1 Properties	<b><i>What’s Different...What’s the Same?</i></b>	Jamie Chapel and Nancy Eberhardt	----
	<b><i>Properties of Materials</i></b> (Readers, 3 Levels)	Marcia S. Freeman/ Newbridge Educational	300-575L (GRL J-L-N)
	<b><i>Seven Blind Mice</i></b>	Ed Young	AD 350L
2.2 Properties of Solids, Liquids, and Gases	<b><i>Matter Comes in All Shapes</i></b>	Amy S. Hansen	150L
	<b><i>What is Matter?</i></b> (Readers, 3 Levels)	Lisa Trumbauer/ Newbridge Educational	250-525L (GRL H-J-L)
	<b><i>Solids, Liquids, and Gases</i></b>	Ginger Garrett	320L

## Lesson 2.1 Properties

### PURPOSE

The purpose of this lesson is to introduce students to the idea that matter can be classified in terms of properties. In general, when we see different types of objects that look different, feel different, and have different characteristics we say these objects have different properties. Students will identify and investigate the different properties of similar objects.

### OBJECTIVES

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

- Use dichotomous sorting to classify a set of attributes
- Define a “fair test”
- Plan an investigation to determine which material is best suited to a specific task

### EMBEDDING LITERACY

**Session 1:** *How can we sort solids by observable properties?*

Before beginning the lesson, have a brief discussion with the class about what *observable* means. Generally, it means something we can see, such as color or size.

Share the following book with the students. (Make sure you have read “How to Use This Book” on the first page.)

#### ***What’s Different...What’s the Same?***

Jamie Chapel and Nancy Eberhardt

Take a look at a pair of photographs. What is the same about the two objects? What is different? Use what you know about color, shape, and texture to observe the similarities and differences between the two.

- Review with students the words *color*, *shape*, *texture*, and *weight*. Tell them that they will use their observational powers to determine what is the same or what is different between the objects in two photographs.
- Start with the photos of the block of clay compared to the clay shaped into a rose. Ask students to identify the characteristics of the block of clay and the rose shaped from it. What is the same about the two objects? What is different? Repeat with the remaining photos in the book.
- Continue emphasizing the properties of materials by reading the following book.



## ***Properties of Materials***

Marcia S. Freeman

This book explores the concept that various materials have different properties that behave in different ways.

Read the appropriately-leveled version of this title to the whole class, and follow up later in small groups with leveled readers as necessary. As you progress through the text, promote discussion that allows students to pick up on the following themes:

1. Different materials have different properties that we can see or feel
2. We can also learn about the qualities of various materials by testing them
3. If we know the properties of materials, we can determine the best materials for a job

Tell students that they will soon test materials to see which one is the best one for a specific job.

*Proceed with the remainder of the session.*

### **Session 2:** *How can we sort objects by observable properties?*

Read the following book, which emphasizes that we need to know about more than just one part of an object to understand the whole thing.

## ***Seven Blind Mice***

Ed Young

In this charming story, seven blind mice are surprised by Something camping out by their pond. On six successive days, one mouse at a time explores some piece of the Something and returns to the others with a firm conviction about what the Something is. Finally, the seventh mouse solves the mystery.

Say to students, **“It is easy to describe observable properties of something if we use as many senses as possible, especially sight. But what if you could only use your sense of touch? You would only be able to determine the texture of the object, but that might not give you enough information to identify the object.”**

- Begin reading *Seven Blind Mice* to the class. As you read, stop to discuss what each mouse thinks its part of the object is, and why. Ask students why they think the mice begin fighting after the blue mouse returns from his examination of the Something.
- What is the white mouse’s strategy for exploring the Something? Why does it work? What does he discover?
- Discuss the Mouse Moral on the final page. Ask students what they think it means.

*Proceed with the remainder of the session.*

## Lesson 2.2 Properties of Solids, Liquids, and Gases

### PURPOSE

The purpose of this lesson is to introduce students to the states of matter. Matter is defined as everything that takes up space and has mass. Students explore the differences between a solid, a liquid, and a gas and then learn how the differences can be explained in terms of the arrangements of small particles.

### OBJECTIVES

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

- Recognize that all matter takes up space and has mass
- Differentiate between solids, liquids, and gases, based on observable properties

### EMBEDDING LITERACY

**Session 1:** *What are states of matter?*

At the beginning of the lesson, introduce the concept of matter by reading the following book.

***Matter Comes in All Shapes***  
Amy S. Hansen

Written for young students, this book explores the concept of matter. Students learn the definition of matter and that it comes in different shapes (solid, liquid, and gas). They also learn that energy is NOT matter because it does not have mass or take a shape.

- Ask students to listen for the definition of *matter* as you read pages 4-7. Invite responses at the conclusion of this section and have students give examples of matter.
- Read pages 8-17 and listen for whether all matter is the same. If it is not, what kinds of matter are there?
- Read pages 18-21. Alert students to listen for what is NOT matter and why. Show them the picture of the chocolate chip cookie on page 20. Is it matter? How can you tell?

Continue exploring the concept of matter with the following book:

### ***What is Matter?***

Lisa Trumbauer

This book defines matter and explores its three states, including the properties of each state. It also addresses the question of whether matter can change its state.

Read the appropriately-leveled version of this title to the whole class, and follow up later in small groups with leveled readers as necessary. As you progress through the text, promote discussion that allows students to pick up on the following themes:

1. Definition of matter
2. The three states of matter
3. Properties of solids, liquids, and gases
4. Matter can change states

*Proceed with the rest of the session.*

#### **Session 2: *How can we describe observable properties of liquids?***

Before beginning this session, read the following book to students. It presents concepts covered in this session, as well as the next two sessions.

### ***Solids, Liquids, and Gases***

Ginger Garrett

Colorful photographs and simple text motivate young students to learn about different forms of matter. They learn that everything is made of matter and that matter occurs as solids, liquids and gases.

Tell students that this book will give them a brief introduction to solids, liquids, and gases. During the remainder of this session and during the next two sessions, they will learn more about each of these three states of matter.

- Alert students to listen for some of the properties of solids as you read pages 3-8. After reading this section, invite students to share specific properties of solids.
- Alert students to listen for some of the properties of liquids as you read pages 9-11. Ask students to share what they learn about the properties of liquids in this section.
- Ask students to listen for some of the properties of gases as you read pages 12-15. After you have read, ask students to share what they have learned about the properties of gases.
- Read pages 16-19 and ask students to explain how a burning candle can go through three states of matter.
- Show students pages 20-27. Then ask them to explain how human beings contain all three states of matter.

## BUILDING LANGUAGE FOR LITERACY

Divide the class into pairs of students. Ask each pair to look at the following photos in *What's Different...What's the Same?*:

- Clay → rose
- Corn kernels → pop corn
- Broken eggs → scrambled eggs
- One balloon → balloon animal
- Sheets of paper → paper cranes
- Liquid gelatin → gelatin cubes

Ask the pairs to select one set of the “before and after” photos and write a paragraph that identifies the change as *reversible* or *irreversible*. They should then explain *why* the change is reversible or irreversible.

# LIFE SCIENCE

# UNIT 1: ECOSYSTEMS

Plants and animals are living things. All living things grow, take in nutrients, breathe, reproduce, eliminate waste, and die. All living things 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. All living things have characteristics that make it possible for them to survive in their own specific habitat. There are many types of habitats within ecosystems throughout the world.

Plants and animals have physical structures and behaviors, called adaptations, which help them meet their basic needs in their own specific habitats or ecosystems. These adaptations are for information processing, eating, moving, protection, and defense. Adaptations are developed over time. Some animals have developed adaptations that allow them to live in multiple ecosystems, while others have adaptations specific to one type of ecosystem. Plants and animals are also interdependent. They rely on one another for survival.

Animals (consumers) depend on plants and other animals as a food source. Some animals eat only plants (herbivores), some eat only other animals (carnivores), and some eat both plants and animals (omnivores). Some take their nutrients from dead organisms (decomposers) and then return these nutrients to the soil for plants to use in their food production. This transfer of energy is called a food chain.

Plants and animals interact with the other living things in their habitat, but they also interact with the nonliving parts of their habitat, such as soil and water. Both plants and animals require adequate space to grow or find food. When significant change occurs to any part of a habitat, that change affects relationships within the habitat.

In this unit, teachers can use literature to help students understand the concept of ecosystems (habitats) and how a living thing is adapted to meet its specific needs for survival in its habitat. The titles listed below fit the criteria for inclusion in this unit.

## RECOMMENDED LITERATURE

Recommended titles are listed on the next page, 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 Plant Munchies – What Plants Need to Survive	<b><i>Terence the Space Tomato</i></b>	Jennifer Baxter	650L
	<b><i>How Do Plants Survive?</i></b>	Kelley MacAulay	580L
1.2 Habitat, Sweet Habitat	<b><i>The ABCs of Habitats</i></b>	Bobbie Kalman	570L
	<b><i>Land Habitats</i></b>	Bobbie Kalman	500L
	<b><i>Water Habitats</i></b>	Bobbie Kalman	510L
1.3 Adaptations and Interdependency	<b><i>Animal Spikes and Spines</i></b>	Rebecca Rissman	550L
	<b><i>Animal Spikes and Spines Series:</i></b> <b><i>Teeth</i></b> <b><i>Beaks</i></b> <b><i>Spines</i></b>	Rebecca Rissman	170L
			190L
			220L
	<b><i>Swimmy</i></b>	Leo Lionni	570L
	<b><i>Cactus Hotel</i></b>	Brenda Guiberson	860L
	<b><i>Seeds, Bees, and Pollen</i></b>	Julie Lundgren	540L
<b><i>Seeds Get Around</i></b> (Readers, 3 Levels)	Melvin Berger, Nancy White / Newbridge Educational	175-325L (GRL F-H-J)	
1.4 Eat of Be Eaten – Food Chains	<b><i>Food Chains and You</i></b>	Bobbie Kalman	860L
	<b><i>What is a Carnivore?</i></b>	Bobbie Kalman	520L
	<b><i>What is an Herbivore?</i></b>	Bobbie Kalman	590L
	<b><i>What is an Omnivore?</i></b>	Bobbie Kalman	610L
	<b><i>Predators and Prey</i></b> (Readers, 3 Levels)	Marcia S. Freeman / Newbridge Educational	275-475L (GRL I-K-M)

## Lesson 1.1 Plant Munchies - What Plants Need to Survive

### PURPOSE

Plants and animals are living things. All living things grow, take in nutrients, breathe, reproduce, eliminate waste, and die. Plants and animals need air, water, food (nutrients) and space or shelter in order to live and grow. Plants also need light to live and grow. Green plants are the only living things that make their own food. They cannot move from one place to another to find food so they make their own from water, nutrients, air (carbon dioxide) and light. The purpose of this lesson is for students to explore the basic needs of plants by designing a guided inquiry, and learning how a plant's structures help the plant meet its basic needs.

### OBJECTIVES

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

- Explain that all of a plant's basic needs must be met in order for it to live and grow
- Describe the roles that a plant's roots, stems, and leaves play in its food production and survival
- Plan and carry out a guided inquiry about the basic needs of plants
- Record observations from the inquiry
- Communicate ideas about their observations both verbally and in writing

### EMBEDDING LITERACY

**Session 1:** *What does a plant need to survive?*

In this session, students learn about the basic needs of plants. *Terence the Space Tomato* may be used to introduce the topic.

#### ***Terence the Space Tomato*** Jennifer Baxter

Terence is a tomato plant growing in the hydroponic chamber on the International Space Station where all his basic needs are met. Then one day he catches a glimpse of the Earth through a window on the Space Station. Terence becomes curious about what he sees. He will soon be on an adventure to discover the differences between living in the hydroponic chamber in space and a garden on Earth!

In Kindergarten, students learned about the characteristics and basic needs of living things. They learned that plants are living things, and that plants need certain things to live and grow. Pose the following questions and have a brief discussion to activate prior knowledge about plants and their basic needs. (Suggested answers are provided.)



There's no need for a lengthy discussion – just get students thinking and expose any misconceptions (which will be addressed as the lesson progresses).

- Are plants living things? [Yes.]
- How do you know? [They grow, make more plants/reproduce, need “food,” and need air.]
- What do plants need to grow? [Water, light, air, soil.]

Continue by asking, “**Can plants grow in space?**” Answers may vary greatly. Then ask, “**How would their basic needs be met?**” Again, answers will vary. Next, introduce the story: “**Here is a story about a tomato plant that grows on a space station. Some parts of the story are real, or nonfiction. Other parts of the story are not real, or fiction. Think about that as we read the story and we will talk more about it at the end.**”

Read *Terence the Space Tomato*, stopping to discuss the story as needed and to point out how the illustrations support the text. The illustrations were done by a second-grade student!

Continue with the rest of the session.

**Additional Text:** The following additional text reinforces the concept of the basic needs of plants, and how plants are able live in different ecosystems.

### ***How Do Plants Survive?***

Kelley MacAulay

This book uses simple text and detailed photographs to show how plants use their physical structures to help them meet their basic needs in some very different habitats.

- This book addresses all concepts in this unit on habitats and living things. It may be read not only in this lesson, but also again at any point during the remainder of the unit when each concept is introduced.
- Preview the cover with students, calling attention to the cactus. Depending on prior experiences with cactuses, students may not realize that it is a plant with specialized structures for living in an extremely dry habitat.
- Continue reading the book. Point out how each “chapter” has its own title to introduce the main idea. The photographs, bold vocabulary, and simple labels support the text.

## BUILDING LANGUAGE FOR LITERACY

1. Have students share or write **cause and effect statements** about what happens if each basic need of a plant is not met. The idea is to show that one part of the sentence contributes to the other part. Use the following type of sentence frame:

When/If a green plant does not have enough light to grow, it \_\_\_\_\_.

When/If a green plant does not have enough water/too much water, it \_\_\_\_\_.

When/If a green plant does not have enough space to grow, it \_\_\_\_\_.

2. Have students share or write **observations** using specific, descriptive, and concise vocabulary.

Example of specific language: The grass is yellow near the top but still green near the bottom.

Example of vague language: The grass looks sick.

3. You may wish to have students create a response to answer the following question:

**If you were to plant your own garden at home or at school, what would you need to do to make sure that your plants grow well and are healthy?**

Depending on the ability of individual students, give students a variety of different response choices, such as a paragraph, a numbered or bulleted list of considerations, or even a series of labeled sketches or diagrams that represent the basic needs that must be provided.

## Lesson 1.2 Habitat, Sweet Habitat

### PURPOSE

The purpose of this lesson is for students to examine the characteristics of different types of ecosystems and how they provide habitats for the plants and animals that live in them. This lesson places emphasis on reading for information using nonfiction text. Students build comprehension and note taking skills. Because of the reading focus, any part of this lesson could be taught during a reading or ELA block.

### OBJECTIVES

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

- Compare characteristics of the following ecosystems: woodland forest and rainforest; desert and polar (tundra); and fresh and saltwater
- Give examples of animals and plants that live in each ecosystem
- Understand that within each ecosystem there are many habitats which are able to support the plants and animals suited specifically to living there
- Locate main idea and details in content-based nonfiction text using text features

### EMBEDDING LITERACY

**Note:** Informational texts have been written specifically for this lesson. The text for each session is referenced in the *Knowing Science* Teacher Manual. Books in this lesson are intended for use as read-alouds.

#### **Session 1:** *What is a habitat?*

Refer back to [Lesson 1.1 Plant Munchies—What Plants Need to Survive](#) and review the basic needs of all living things: food (nutrients), water, air (oxygen for animals and carbon dioxide for plants), appropriate temperature, space, and shelter. Brainstorm different places that animals and plants might live, such as forests, oceans, deserts, ponds. Ask, “**What do these places have in common?**” [Animals and plants can meet their basic needs there.]

You may use the first two chapters [The ABCs of Habitats](#) to introduce the session, or read it as a follow-up at another time. Suggested passages are provided for each session.

#### ***The ABCs of Habitats***

Bobbie Kalman

Habitats are the natural places where plants and animals live. This book introduces deserts, forests, oceans, ponds, grasslands, polar regions, and mountains to young children.

Introduce the cover and point out that this is an ABC book. Take time to discuss the text as necessary, and call attention to photographs with captions as a text feature. Point out how each “chapter” has its own title to introduce the main idea. (Labels, drawings, bold vocabulary, and inset boxes are also used throughout the book.)

Continue with the rest of the session.

**Session 2:** *What are the similarities and differences between woodland and rainforest ecosystems?*

Introduce the woodland forest and rainforest ecosystems by reading the following selections from *The ABCs of Habitats*: “Forest Habitats” (page 11), “Rainy Rainforests” (page 24), and “Jungles are Hot!” (page 16). You may also read pages 4-11 of *Land Habitats*.

***Land Habitats***  
Bobbie Kalman

Mountains, deserts, grasslands, forests, and wetlands are just some of the many habitats discussed in this book. The weather, plants and animals in each habitat are presented using simple text and photographs.

As you read, stop to discuss how illustrations, captions, labels, and call-outs support the text.

Continue with the rest of the session.

**Session 3:** *What are the similarities and differences between desert and tundra ecosystems?*

Introduce the desert and tundra ecosystems by reading the following selections from *The ABCs of Habitats*: “Dry Deserts” (page 9), “Icy Habitats” (page 15), and “Treeless Tundras” (page 27). You may also read pages 24-31 of *Land Habitats*.

As you read, stop to discuss how illustrations, captions, labels, and call-outs support the text.

Continue with the rest of the session.

**Session 4:** *What are the similarities and differences between ocean and fresh water ecosystems?*

Introduce the ocean and fresh water ecosystems by reading the following selections from *The ABCs of Habitats*: “Ocean Habitats” (page 21), “Colorful Coral Reefs” (page 8), “Kelp Forests” (page 17), “Seashores” (page 26), “Pond Life” (page 22), and “Wetland Habitats” (page 30). You may also any or all of *Water Habitats*.

***Water Habitats***  
Bobbie Kalman

All kinds of water habitats, including oceans, lakes, rivers, and swamps are discussed in this book. This book also discusses the differences between salt and freshwater habitats, plant and animal life, and how animals protect themselves in these habitats.

As you read, stop to discuss how illustrations, captions, labels, and call-outs support the text.

Continue with the rest of the session.

## **BUILDING LANGUAGE FOR LITERACY**

1. Have students write an “*ABCs of Ecosystems*” picture book using details from each ecosystem studied, including plants, animals, and main features. Students can research additional information about each ecosystem as needed to represent each letter of the alphabet.
2. Use *Activity Sheet 7: Ecosystem Details* to show students how to write simple, non-rhyming science poetry. Choose an ecosystem and focus on its specific details. You might consider haiku or shape poems.
  - Haiku is based on syllables: five in the first line, seven in the second, and five again in the third. Second graders might need help counting syllables, so creating a class poem is helpful to students before they tackle writing a poem with a partner or individually.
  - Shape poems are also non-rhyming. Choose an easy-to-draw plant, land form, or even animal representative of the chosen ecosystem. On a planning page, list details to describe the ecosystem. Then fit the non-rhyming descriptive details around the outside of the shape. Advise students to make pencil sketches before they attempt a final copy, because fitting words around the shape may be tricky. Repeating the list of descriptive words is also an option.

## Lesson 1.3 Adaptations and Interdependency

### PURPOSE

The purpose of this lesson is for students to understand how various types of physical and behavioral adaptations assist animals and plants in survival. This lesson also places emphasis on reading, comprehending, and following procedural texts. Students will be expected to follow simple directions for completing activities with assistance as needed.

### OBJECTIVES

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

- Differentiate between structural and behavioral adaptations
- Classify adaptations in terms of basic needs: taking in water and nutrients, breathing, defense and protection from predators, finding shelter, and managing body temperature
- Give examples of external structures and information processing systems which are suited to a particular ecosystem
- Explain interdependent relationships between animals and plants in any given ecosystem (pollination, seed dispersal, food, and shelter)
- Locate main idea and details in content-based nonfiction text using text features

### EMBEDDING LITERACY

**Session 2:** *How can body parts (structures) help protect an animal?*

Review the adaptations for eating from the previous session. Then ask for reasons why an animal would want to defend itself (to ensure survival; to protect offspring, shelter, or territory).

Ask what students already know about protective structures of animals. Porcupine quills, puffer fish spines, and various dinosaur features are great examples of protective structures. If no one mentions camouflage, prompt them to talk about animals that have the ability to blend in or change color. Camouflage is considered a physical adaptation because coloration is part of the animal's body. Students probably already know about scent release, but they may need to be reminded. Skunk spray (or scent release in other animals) is also considered a physical adaptation, as the scent glands are a physical structure.

Read *Animal Spikes and Spines*.

#### ***Animal Spikes and Spines***

Rebecca Rissman

This book introduces readers to different animal body parts, and how these body parts help animals to survive.

As you read, stop to discuss the story as needed and to point out how the photographs support the text, as well as how page/chapter headings provide the main idea for each section. Based on these headings and details from the book, start generating a list of body parts under the *Structures for Protection* heading for the chart started in the previous session.

**Additional Texts:** Three other texts in the *Animal Spikes and Spines* series are provided. These books are at a lower reading levels (Lexile Level 170L, 190L, 220L). You may have students that can read them independently or with a partner.

***Animal Spikes and Spines: Teeth***

Rebecca Rissman

This title uses simple and predictable text, photographs, and labels to introduce reader to various types of teeth, what they are made of, and how they help animals survive.

***Animal Spikes and Spines: Beaks***

Rebecca Rissman

This title uses simple and predictable text, photographs, and labels to introduce reader to various types of beaks and how they help animals to survive.

***Animal Spikes and Spines: Spines***

Rebecca Rissman

This title uses simple and predictable text, photographs, and labels to introduce reader to various types of spines and how they help animals survive.

**Session 3:** *How can behaviors protect an animal?*

In this session, students will participate in an activity that demonstrates why fish swim in schools as an example of a protective behaviors.

Begin the session by reviewing the *Structures for Eating* and *Structures for Protection* lists on the Adaptation chart. Begin a list of known behaviors for defense under the *Behaviors for Protection* heading. These may be individual behaviors or group behaviors. For example, puffing up to look bigger, hiding, building a shelter to keep predators out, herding, playing dead, or running away.

Introduce the activity by asking if students know why fish swim in schools. In first grade, students learned how living in a group protects animals. Ask what they may remember about living in a dolphin pod and how the group helps its members (finding food, caring for offspring, protection).

Introduce the activity by reading *Swimmy* to students (or simply review it, if students are already familiar with the story). This is an example of a behavioral adaptation, as fish swim together in a school to avoid predators.

***Swimmy***  
Leo Lionni

Deep in the sea lives a happy school of fish. Their watery world is full of wonders, but there is also danger, and the little fish are afraid to come out of hiding . . . until Swimmy comes along. Swimmy shows his friends how—with ingenuity and team work—they can overcome any danger.

In the following game, students will represent predators and prey (a school of little fish). Continue with the rest of the session.

**Session 4:** *How can plants and animals help each other?*

Determine students' prior knowledge about plant and animal interdependency by asking what students already know about how plants help animals survive, and how animals help plants survive. Responses may include plants providing food and shelter for animals, animals spreading seeds and pollinating flowers, etc.

Introduce *Cactus Hotel*. Ask if students know what a hotel is, and how a cactus might act as a hotel for animals.

***Cactus Hotel***  
Brenda Guiberson

In the Sonoran Desert, many animals make their home in the great saguaro cacti. Read about the many creatures that depend on this giant cactus.

While reading, ask students to point out ways that plants and animals help each other. Emphasize that this book is an example of narrative nonfiction. It presents information in a story format.

Continue with the rest of the session.

**Sessions 5-6:** *How do adaptations help a living thing in its own habitat?*

In these sessions, students will participate in station activities where they explore how plant and animal adaptations help each living thing meet its basic needs for survival. *Pollination Station* simulates how pollen can be transferred from flower to flower.



Read *Seeds, Bees, and Pollen* either as an introduction to this station or at another time.

***Seeds, Bees, and Pollen***  
Julie Lundgren

This book introduces students to the idea of plant reproduction, using simple text, close-up photographs, and labeled illustrations.

As you read, stop as needed for brief discussion and point out how the photographs support the text. Although this text discusses seed and non-seed plant reproduction, the focus should be on plants that reproduce using seeds.

Continue with the rest of the session.

**Additional Texts:** These titles may be used as supplementary texts.

***Seeds Get Around***  
Melvin Berger, Nancy White / Newbridge Educational

Children learn that plants grow both from seeds we plant and from those that are carried by wind, water, animals, car tires—even by themselves!

### **BUILDING LANGUAGE FOR LITERACY**

Distribute the nonfiction texts used in this lesson to small groups of students. Have each group do the following: (It is not necessary for students to be able to read each text, just to review it.)

- a. Identify the main purpose of the text, including what the author wants to answer, explain, or describe;
- b. Explain how specific images contribute to or clarify the information in the book;
- c. Determine which text features (captions, bold print, subheadings, index, and so on) the book uses to help the reader access information;
- d. Identify details in the text that support the main idea or topic.

## Lesson 1.4 Eat or Be Eaten – Food Chains

### PURPOSE

The purpose of this lesson is for students to understand the essential connection between plants and animals for food and for survival. The sun is the source of energy for every food chain. Plants are the primary food source for each food chain. Students will learn the difference between producers (plants), and various consumers (animals). Finally, they will be able to describe the role of each living thing in a food chain.

### OBJECTIVES

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

- Differentiate between and give examples of producers and consumers
- Differentiate between and give examples of herbivore, carnivore, omnivore, decomposer, predator, and prey
- Construct a food chain that correctly shows the relationship among the sun, producers, consumers, and decomposers
- Explain how the members of any food chain or food web are connected to, or dependent upon, each other

### EMBEDDING LITERACY

This lesson also places emphasis on reading for information using nonfiction text written specifically for this lesson. Students build comprehension and note taking skills. Because of the reading focus, any reading part of this lesson could be taught during a reading or ELA block.

**Session 1:** How am I part of a food chain?

Close the lesson by reading the following selections from *Food Chains and You*:

(pages 4-11)

“Living Things Need Food”

“Energy from the Sun”

“What is a Food Chain?”

“An Energy Pyramid”

(pages 22-23)

“Where Do We Get Food?”

### ***Food Chains and You***

Bobbie Kalman

*Food Chains and You* explains how the transfer of energy takes place from the sun to various plants and animals, including people. It shows children how they, too, are part of food chains. Children will learn about: herbivores, carnivores, omnivores, and decomposers.

**Session 2:** *What's the difference between predator and prey?*

In this session, students read a nonfiction text about the topic and answer questions. Then they participate in a predator and prey simulation activity. *Food Chains and You* (pages 16-19) may be read to introduce the session. Selected pages from *What is a Carnivore?* may be read at another time.

***What is a Carnivore?***

Bobbie Kalman

Carnivores are animals that eat other animals. This clearly written book uses detailed images to look at insect, fish, frog, reptile, arthropod, and mammal carnivores and how they hunt or find their food. It also explains terms such as predator and prey and introduces the basics of a food chain.

**Session 3:** *What is an herbivore, carnivore, omnivore, or decomposer?*

In this session, students read a nonfiction text about the topic and answer questions. To introduce the session, read the following selections from *Food Chains and You*: “Animals that Eat Plants,” “Plant Foods for People,” “Not Fussy Eaters,” and “Nature’s Cleaners” (pages 12-15 and 26-27). Selected pages from *What is a Herbivore?* and *What is an Omnivore?* may be read at another time.

***What is a Herbivore?***

Bobbie Kalman

Herbivores eat plants, but they don't all eat the same kinds of plants or plant parts. This book looks at animals that eat grass, leaves, flowers, cacti, fruit, pollen and nectar, and wood. Photographs also feature animals, such as koalas and pandas which eat very specialized plant foods such as eucalyptus leaves and bamboo.

***What is an Omnivore?***

Bobbie Kalman

Omnivores will never go hungry because they will eat almost anything because these animals eat both plant and animal foods. Well-known omnivores include bears and raccoons. Less well-known omnivores are many insects, birds, and even people.

**Session 4:** *How can I show relationships in a food chain?*

In this session, students read a nonfiction text about the topic, answer questions, and then build their own representative food chains. Begin the session by rereading “What is a Food Chain?” (pages 8-9) from *Food Chains and You*.

Continue with the rest of the session.

**Session 5:** *What happens when food chains and food webs change?*

In this session, students read a nonfiction text about the topic and answer questions before participating in an activity where they build a food web from several food chains. Begin the session by reading *Food Chains and You*: “Food Webs and You” (pages 24-25), “Dangers to Food Webs” (pages 28-29), and “How You Can Help” (pages 30-31).

Continue with the rest of the session.

**Additional Texts:** These titles may be used as supplementary texts.

***Predators and Prey***

Marcia S. Freeman / Newbridge Educational

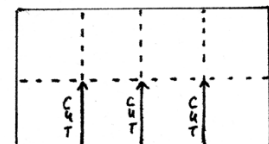
Finding food is hard work for animals in the wild. Students learn some of the amazing ways these animals catch their prey for every meal.

**BUILDING LANGUAGE FOR LITERACY**

1. Use the **Alphabox** strategy (developed by Linda Hoyt) to list important vocabulary words as the sessions progress. To be added to the list, a word must specifically pertain to the topics being studied (e.g. producer, consumer, herbivore, carnivore, omnivore, and so on). The vocabulary listed at the beginning of the session is a good place to start. An example of what an Alphabox graphic organizer might look like for this lesson is provided on the next page:

<b>A</b> Air Animal	<b>B</b> Basic needs	<b>C</b> Carnivore Consumer	<b>D</b> Decomposer
<b>E</b>	<b>F</b> Food chain Food web	<b>G</b> Grow	<b>H</b> Herbivore
<b>I</b>	<b>J</b>	<b>K</b>	<b>L</b> Leaf Light Living
<b>M</b>	<b>N</b> Nutrients	<b>O</b> Omnivore	<b>P</b> Plant Predator Prey Producer
<b>Q</b>	<b>R</b>	<b>S</b> Sun Soil	<b>T</b>
<b>U</b>	<b>V</b>	<b>WX</b> Water	<b>YZ</b>

- Have students write a first-person narrative. The narrative could be from the point of view of an animal that is part of a food chain or food web. Or, use the starter, “I am energy from the Sun. Here is the story about how I help provide food and energy for living things.” Students should use plants and animals from *Sessions 4* and *5*, and tell how food energy is passed along. Encourage students to use sequencing or time-order words such as: *first, next, then, after that, finally, last, or at the end.*
- Show students how to make a predator and prey “lift the flap” book. Fold a piece of copy paper in half the long way. Unfold and cut one side into three or four flaps, stopping at the initial fold line. Refold the paper. Draw or write the name of a predator on the top of the flap and draw or write the name of its prey underneath the flap. See examples at [www.bookmakingwithkids.com](http://www.bookmakingwithkids.com).





# **EARTH AND SPACE SCIENCE**

# UNIT 1: EARTH'S LAND

Within the broad category of earth and space sciences, second graders focus on the physical features of the natural world. They learn about the processes involved in the formation of the earth and the landforms that characterize its surface; the slow changes that wind and water can make in the earth's surface; and the fast changes caused by cataclysmic events such as earthquakes.

Children's literature plays a role in engaging students in the study of the earth sciences. Various titles introduce, summarize, supplement, or reinforce concepts associated with the earth's ever-changing surface. Books that work well for this unit include those that focus on the history of the earth and the impact of wind and water on the earth's surface.

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 Earth's Land and Water	<i>Learning about Landforms: Islands</i>	Ellen Labrecque	NC 770L
	<i>Learning about Landforms: Mountains</i>	Chris Oxlade	NC 760L
	<i>Learning about Landforms: Valleys</i>	Ellen Labrecque	NC 720L
1.2 Fast and Slow Changes	<i>Learning about Landforms: Volcanoes</i>	Chris Oxlade	NC 820L (GRL M)
	<i>Fearsome Forces of Nature</i>	Anita Ganeri	NC 760L (GRL M)



## Lesson 1.1 Earth's Land and Water

### PURPOSE

In this lesson, students learn about landforms and water features. Landforms are natural features on Earth's surface such as mountains, hills, valleys, and plains. Water features include oceans, rivers, lakes, and ponds. Students create models to represent these various features.

### OBJECTIVES

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

- Explain how landform maps serve as models of Earth's features
- Locate and describe the main types of landform and water features
- Differentiate between salt and fresh water features
- Create a model to represent landforms and water features

### EMBEDDING LITERACY

**Note:** Informational texts have been written specifically for this lesson. Students build comprehension and note taking skills. Because of the reading focus, any reading part of this lesson could be taught during a reading or ELA block. The text for each session is referenced in the *Knowing Science* Teacher Manual. Books included in this lesson are intended for use as supplementary texts.

Basic information about landforms can be found in *Activity Sheet 5* contained in Session 3: *What are landforms?* Students can expand their knowledge of particular landforms by reading these additional texts and engaging in the activity described below in **Building Language for Literacy**.

#### ***Learning About Landforms: Islands***

Ellen Lebreque

Learn about these unique landforms. Discover the different island types, how islands are formed, and what living things can be found on and around islands.

#### ***Learning About Landforms: Mountains***

Chris Oxlade

Learn about these unique landforms. Discover the different mountain types, how mountains are formed, and what living things can be found in and around mountains.

## ***Learning About Landforms: Valleys***

Ellen Lebreque

Learn about these unique landforms. Discover the different valley types, how valleys are formed, and what living things can be found in and around valleys.

These parallel texts are organized in the same format so they are easy to follow. Introduce and briefly preview each title to show that they are organized in a similar manner. Titles may be read aloud as time permits, since topic specific vocabulary may be challenging for some independent readers.

### **BUILDING LANGUAGE FOR LITERACY**

Divide students into small groups and give each group one of the landform books listed at the beginning of the unit. Students can read the book as a group and write down the following information:

- How was the landform made?
- In what parts of the world can the landform be found?
- What plants and animals live in or near the landform?

Once students have gathered the required information, they can report out to the rest of the class, using pictures or other media to enliven their presentation

## Lesson 1.2 Fast and Slow Changes

### PURPOSE

Earth's surface features change continuously. Some changes are fast and immediately observable, such as earthquakes, volcanoes, flooding, and landslides. Other changes are slower and occur over a longer period of time, such as weathering and erosion. These gradual processes shape landforms with water, ice, wind, living organisms, and gravity. The purpose of this lesson is to provide students with a foundational understanding of the processes that shape Earth's features. This topic will be addressed in greater detail in Grade 4.

### OBJECTIVES

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

- Differentiate between slow and fast changes to Earth's surface
- Explain and give examples of weathering as a slow change
- Explain and give examples of erosion as a slow change
- Explain and give examples of fast changes to Earth's surface

### EMBEDDING LITERACY

**Note:** Informational texts have been written specifically for this lesson. Students build comprehension and note taking skills. Because of the reading focus, any reading part of this lesson could be taught during a reading or ELA block. The text for each session is referenced in the *Knowing Science* Teacher Manual. Books included in this lesson are intended for use as supplementary texts.

#### ***Learning About Landforms: Volcanoes***

Chris Oxlade

Learn about these unique landforms. Discover different volcano types, how volcanoes are formed, and what living things can be found in and around volcanoes.

#### ***Fearsome Forces of Nature***

Anita Ganeri

This book looks at fearsome forces of nature and considers what happens when earthquakes strike, volcanoes erupt, and geysers gush!

***Learning About Landforms: Volcanoes*** is formatted the same way as the other ***Learning About Landforms*** books in Lesson 1.1. Introduce and briefly preview this title to show how it parallels the other titles. It may be read aloud as time permits, since topic specific vocabulary may be challenging for some independent readers.

*Fearsome Forces of Nature* is rich with text features, including detailed photographs, captions, inset “fact” boxes, and vocabulary in bold print. It describes a variety of “fast change” Earth forces. Each section may be read as a “stand alone” passage.

### **BUILDING LANGUAGE FOR LITERACY**

1. Encourage discussion around new learning from this lesson, as well as preconceptions or initial misconceptions at the beginning. Conversations may include statement starters such as, “I used to think that... but now I know that...” or “I did not know that...”
2. Encourage discussion that compares fast and slow changes to the Earth’s surface. How are they similar? How are they different?