

Life Lab Science
Preview Sampler



Second Grade Edition

An Introduction
to the
Life Lab Science Curriculum

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Table of Contents

Second Grade

Introduction	VIII
Implementing Life Lab Science	XV
Life Lab Instructional Model	XXIII
Life Lab Scope and Sequence	XXV
Planning Calendar	XXX

Grade 2 Sensing Changes

Song: "Take the Time to Wonder"	2
Introduction	3
Student Goals	4
Activity Chart	5
Unit Planner	6
Recommended Literature	7
Parent Letter	8
Garden Sense (<i>using the senses to explore the garden</i>)	9
Count Off (<i>playing a game using cooperative skills</i>)	12
Eagle Eyes (<i>using observation skills to detect change</i>)	15
Shape Hunt (<i>using observation skills to find shapes</i>)	18
Add-on Bugs (<i>cooperating to draw an imaginary insect</i>)	21
What's That Sound (<i>creating sound effects for a story</i>)	25
Sound Observations (<i>categorizing sounds</i>)	28
Sense Riddles (<i>cooperating to create riddles</i>)	31

Investigating Plants

Song: "Sun, Soil, Water, Air"	36
Introduction	37
Student Goals	38
Activity Chart	39
Unit Planner	40
Recommended Literature	41
Parent Letter	42
Plant Detectives (<i>distinguishing plants from non-plants</i>)	43
Plant Watchers (<i>planting seeds or seedlings in pots</i>)	46
Plant Care Planners (<i>monitoring seeds; develop-in a plan for care</i>)	50
Scientists at Work (<i>testing an assumption about what plants need</i>)	54
Plant Reporters (<i>recording and discussing the results of the experiment</i>)	58

Investigating Water

Song: "Water Cycle Baja"	62
Introduction	63
Student Goals	64
Activity Chart	65
Unit Planner	66
Recommended Literature	67
Parent Letter	68
Investigating Water (<i>using tools to explore water's properties</i>)	69
Shape Changers (<i>predicting and testing how fast ice cubes melt</i>)	73
Now You See It (<i>investigating rates of evaporation</i>)	77
Water from the Air (<i>investigating condensation</i>)	80
Mini-Terrariums (<i>using plants to test evaporation and condensation</i>)	83
A Book of Water (<i>creating a class book about water</i>)	87

Investigating Air

Song: "Sun, Soil, Water, Air"	92
Introduction	93
Student Goals	94
Activity Chart	95
Unit Planner	96
Recommended Literature	97
Parent Letter	98
Air Detectives (<i>investigating air movement</i>)	99
A Space Case (<i>trapping air underwater</i>)	102
Heavy as Air (<i>weighing the air in balloons</i>)	106
A Matter of Degrees (<i>using a thermometer to measure air temperatures</i>)	109
Breathing Space (<i>measuring lung expansion and contraction</i>)	113
Blowing in the Wind (<i>using breath to move small objects</i>)	116
What's in the Air? (<i>observing that different substances can become part of the air</i>)	119
Visitors from Another Planet (<i>reviewing what students have learned about air</i>)	122

Investigating Food

Song: "Dirt Made My Lunch"	126
Introduction	127
Student Goals	128
Activity Chart	129
Unit Planner	130
Recommended Literature	131
Parent Letter	132
Lunch Lines (<i>tracing food items to their sources</i>)	133
Running on Empty (<i>discovering why humans need food</i>)	136
Eating Right (<i>sorting foods; identifying a balanced diet</i>)	139

Flour Power (<i>investigating grains; grinding wheat into flour</i>)	143
From Fruit to Sauce (<i>investigating fruits and vegetables; making applesauce</i>)	146
Found a Peanut (<i>investigating protein food; making peanut butter</i>)	149
Made from Scratch (<i>making a meal from the foods students processed</i>)	152
Lunchtime Planning (<i>planning healthy menus</i>)	155

Investigating Food Chains

Song: "Decomposition"	160
Introduction	161
Student Goals	162
Activity Chart	163
Unit Planner	164
Recommended Literature	165
Parent Letter	166
Chain of Foods (<i>looking for evidence of a food chain in the garden</i>)	167
Food Machines (<i>transplanting seedlings; thinking about plants as food</i>)	169
Who's Been Eating My Garden? (<i>investigating herbivores in the garden</i>)	172
Bugs for Breakfast (<i>investigating carnivores in the garden</i>)	175
Life Underground (<i>digging for decomposers in the garden</i>)	178
Anything-Eaters (<i>analyzing lunch; determining humans' role in the food chain</i>)	182
Energy Relay (<i>running a relay race to mimic the food chain</i>)	185
Life Goes Around (<i>reviewing in a skit what students have learned about food chains</i>)	188

Investigating Resources

Song: "Ecology"	192
Introduction	193
Student Goals	194
Activity Chart	195
Unit Planner	196
Recommended Literature	197
Parent Letter	198
What's Its Use? (<i>defining what is a natural re-source</i>)	199
Weeds' Needs (<i>setting up an experiment on plant crowding</i>)	203
Tree Tales (<i>identifying different ways people use trees</i>)	207
Papered Over (<i>papermaking with recycled paper</i>)	210
Piles of Paper (<i>setting up a recycling center; devil-owing a paper-conservation plan</i>)	214
The Three OR Club (<i>Creating a "talkshow" presentation on conserving resources</i>)	217

Conserving Resources

Song: "Nature Rap"	222
Introduction	223
Student Goals	224
Activity Chart	225
Unit Planner	226
Recommended Literature	227
Parent Letter	228
WE CARE! (<i>identifying an environmental issue and possible solutions</i>)	229
Water Watchers (<i>analyzing use and misuse of water</i>)	232
Thirsty Garden (<i>determining whether using mulch saves water in the garden</i>)	235
Garbage Inventions (<i>inventing ways to help plants grow</i>)	239
A Toast to Compost (<i>making and maintaining a compost pile</i>)	243
Message to the Future (<i>creating a class conservation plan and book</i>)	246

Appendix: Blackline Masters

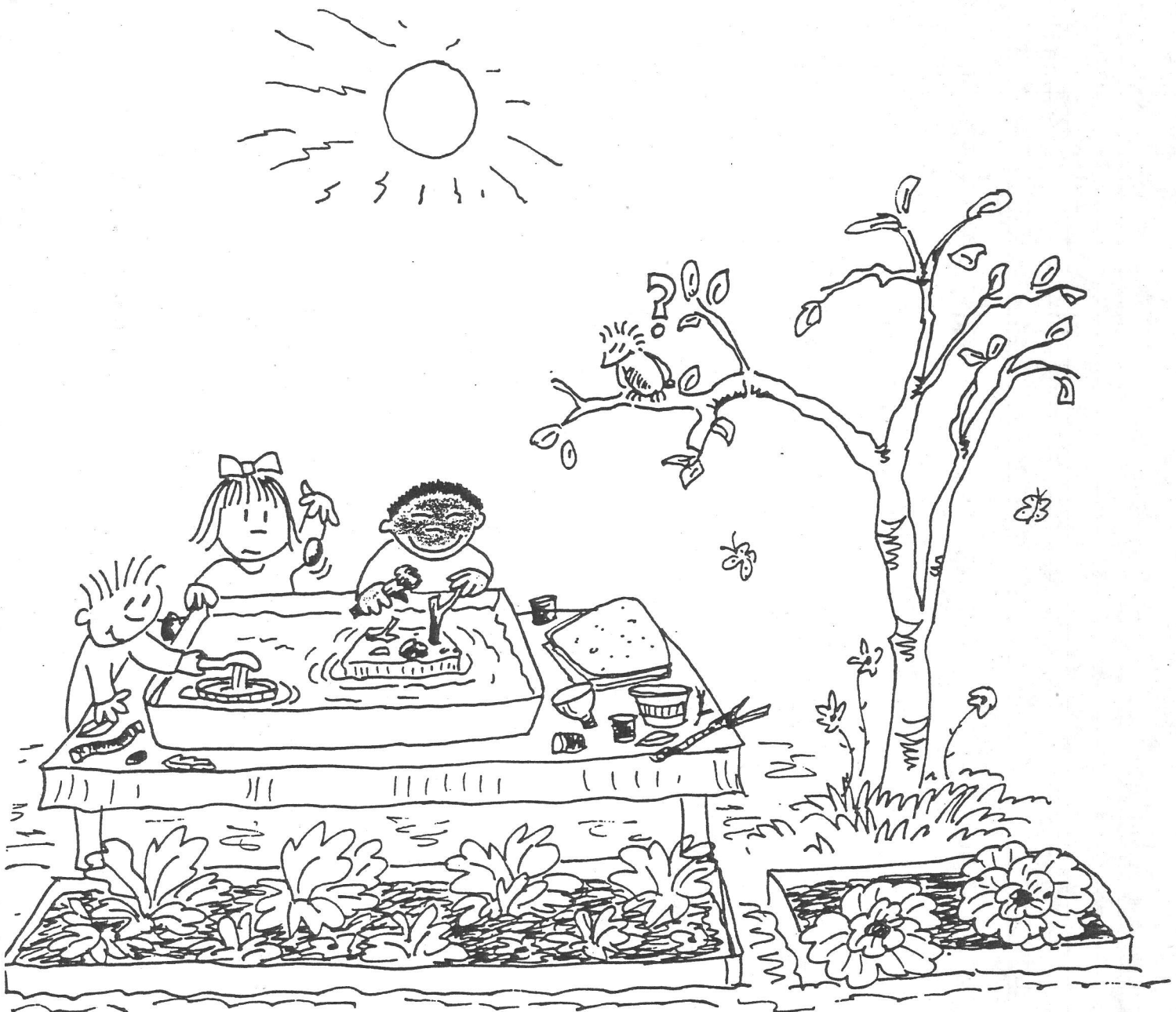
Sensing Changes – Shape Hunt	253
Investigating Air – A Matter of Degrees	254
Investigating Food – Eating Right	255
Investigating Food – From Fruit to Sauce	258
Investigating Food – Found a Peanut	259
Investigating Food – Made from Scratch (Rise and Shine Bread)	260
Investigating Food – Made from Scratch (Quick Bread)	262
Investigating Food – Made from Scratch (Tortillas)	263
Investigating Food – Made from Scratch (Chapattis)	264
Investigating Food Chains – Food Machines	265
Investigating Food Chains – Food Machines	266
Investigating Food Chains – Plant-Eaters	267
Investigating Food Chains – Bugs for Breakfast	268
Investigating Food Chains – Life Underground	269
Investigating Food Chains – Anything-Eaters	270
Investigating Food Chains – Energy Relay	271
Seed Saving	272
Double-digging	273
Indoor Gardening	274
Gardening Books	275

Glossary (Spanish/English) 277

References 280

Index 281

Investigating Water



Water Cycle Boogie

Written by Doug Greenfield

The musical score consists of six staves of music in a treble clef with a key signature of one sharp (F#) and a 4/4 time signature. The lyrics are written below the notes, and chord markings (A, B, D, E) are placed above the staff lines. The lyrics are: E - va - po - ra - tion, con - den - sa - tion, pre - ci - pi - ta - tion. The wa - ter cy - cle boogie goes round and round. The wa - ter cy - cle boogie goes up and down. The sun gives the wa - ter cy - cle po - wer to spin. The wa - ter goes up and down a - gain. The sur - face of all wa - ter heats up with the sun. The va - por ri - ses up and then the boogie's be - gun. What's that called? What's that called? E - va - po - ra - tion.

CHORUS: Evaporation, Condensation, Precipitation
Water cycle boogie goes round and round
Water cycle boogie goes up and down

Water holds together chemically
Hydrogen bonding is what you see
All those airborne vapors they squeeze together
To form a cloud that could change the weather

What's that called? What's that called?
(CONDENSATION)

CHORUS: Condensation, Precipitation, Evaporation
Water cycle boogie goes round and round
Water cycle boogie goes up and down

All those dark clouds can't hold together
Water boogies down bringing stormy weather
Fog, rain, hail, flurries, ice, and sleet
Splish, splash, and crunch underneath your feet

What's that called? What's that called?
(PRECIPITATION)

CHORUS: Precipitation, Evaporation, Condensation
Water cycle boogie goes round and round
Water cycle boogie goes up and down

Two thirds of earth is water, it's true
Gives life to every plant and animal too
Respect water's power, only use your share
Don't waste a drop, there's none to spare
Let's do the water cycle boogie again
Let's go for another spin! (REPEAT 1ST CHORUS)

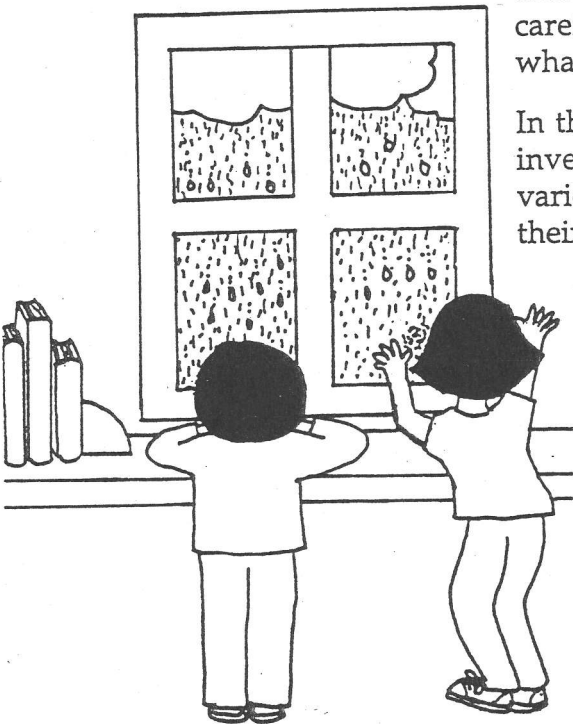
Investigating Water

Sparkling in the light, pouring out of faucets, and billowing as vapor in clouds, water attracts us from the very beginning of our lives. It is, after all, a resource essential to all living things. Life on Earth would be impossible without water.

Children play in water and investigate it endlessly. While most children recognize everyday examples of evaporation, condensation, boiling, and melting, their understanding of these phenomena is often inaccurate or incomplete. For instance, a child may realize that water in puddles disappears, without understanding that the water has not vanished but has become a gas. Another child may know that ice cubes melt, but not connect the melting with heat energy.

Through the activities in this unit, children investigate the scientific explanations for their observations about water. In different activities involving evaporation and condensation, students explore how water changes. They are also introduced to the water cycle. To gain an understanding of how water changes, students observe what happens to ice cubes as they melt, what happens when water evaporates and condenses, and they create their own mini-terrariums. Change is a difficult concept for a second grader, but with careful observation and record keeping, students can understand what happens to water before and after it changes form.

In this unit, students continue to use the techniques of scientific investigation. First, they predict what happens to water under various conditions. Next, students test their ideas and then tell how their ideas compare with the results of their experiments.



Student Goals

Theme: Students will observe how and why water changes form from solid to liquid to gas.

Science Explorations: Students explore water as a natural resource that covers planet Earth and that is needed by all living things.

Process Skills: Students observe water changing form and make predictions based on these observations.

Science Concepts

In this unit students explore Life, Earth, and Physical science concepts through lessons that focus on observing changes and making predictions based on those changes.

Life Science: All living things need water to live and grow.

Earth Science: Most of our planet is covered by water; water continually moves through the water cycle.

Physical Science: Two of the ways water changes form are from liquid to gas and from liquid to solid. Both changes result from changes in temperature.

Science, Technology, and Society: Humans use and need water every day for food, health, recreation, and work.

Unit Activity	Description	Process Skills	Instructional Model			Science Concepts				Related Subjects
			PREASSES.	EXPLORATION & CHALLENGE	APPLICATION & REFLECTION	LIFE	EARTH	PHYSICAL	STS	
Investigating Water	In this preassessment activity, students investigate the properties of water and share their ideas about the substance.	Observing, Communicating	✓			✓	✓	✓	✓	Language Arts
Shape Changers	Groups of students predict what will happen to ice cubes placed in various locations and then test their predictions.	Predicting, Comparing		✓			✓	✓		Math
Now You See It	Students observe water boiling and then form groups to test how evaporation occurs.	Observing, Comparing		✓			✓	✓		Math
Water from the Air	After watching a demonstration, students monitor condensation on the outside of metal cans.	Observing, Comparing		✓			✓	✓		
Mini-Terrariums	Students plant and then water seeds in two cups, one covered and one uncovered. They predict what will happen to the seeds.	Predicting, Applying		✓	✓	✓	✓	✓		
A Book of Water	In this postassessment lesson, students create group books about water to show what they have learned in this unit.	Communicating, Applying			✓	✓	✓	✓	✓	Art, Language Arts

Unit Planner

Activity	Time	Special Arrangements	Literature Links
Investigating Water	Part 1: 45 min Part 2: 30 min	Send home Parent Letter; set up space for children to investigate water in garden or surrounding area; arrange for aide or volunteer.	Shulevitz, <i>Rain Rain Rivers</i>
Shape Changers	Part 1: 30 min Part 2: 45 min	Provide ice cubes that are uniform in size.	Krensky, <i>Snow and Ice</i>
Now You See It	60 min, including monitoring	Plan activity for sunny day; arrange for hot plate or electric pot.	Peters, <i>Good Morning, River!</i>
Water from the Air	40 min	Acquire empty metal cans and ice.	Cummings, <i>C.L.O.U.D.S.</i>
Mini-Terrariums	Part 1: 30 min Part 2: 20 min Note: Part 2 occurs two weeks after Part 1.	Two previous activities are prerequisites for this one; acquire radish seeds and potting soil.	Russell, <i>The Stream</i>
A Book of Water	Part 1: 30 min Part 2: 30 min	Collect nature-oriented magazines for students to cut up.	Peters, <i>Water's Way</i> or Branley, <i>Rain and Hail</i>

Life Lab Videodisc

Find out ways to incorporate the Life Lab Videodisc into this unit by turning to Section 2.3- Investigating Water in the *Videodisc Guide*.

Life Lab Center

The Life Lab Center provides a place for students to store and display their work, browse through science-related books, and monitor ongoing experiments. Allow time each day for students to explore the Center. You might also want to do one or more of the following:

- Make a bulletin board display of students' ideas and questions about water.
- Set up a station equipped with water, cups, balance scales, and other measuring tools, and a variety of other liquids like soda, juice, or detergent and water, for simple experiments.
- Assemble a large terrarium so that children can observe the water cycle.
- Assemble an aquarium to show how plants and animals live in a water environment. Ask students what in the aquarium is alive and whether the water in the aquarium is living or nonliving.

Garden Activities

- Transplant seedlings from the Mini-Terrariums lesson.
- Observe water evaporating from puddles in the garden.
- Observe where rain goes when it falls on the garden.
- Practice watering techniques. (See *Gardening Know-How for the '90s*, pp. 13-14, 45, 47, 72-74, for information on watering.)
- Set up water conservation experiments in the garden.

Recommended Literature

Story Books

- Andrews, Jan. *Very Last First Time*. New York: McElderry, 1986. An Inuit child goes below the ice at low tide to hunt mussels for the first time.
- Briggs, Raymond. *The Snowman*. New York: Random, 1978. When a snowman comes to life, a little boy invites him home and in return is taken on a flight high above the countryside.
- Cole, Joanna. *The Magic School Bus at the Waterworks*. New York: Scholastic, 1986. Ms. Fizzle takes her class on a magical trip to the waterworks—an entertaining trip full of science facts.
- Cummings, Pat. *C.L.O.U.D.S.* New York: Lothrop, 1986. Chaku is in charge of making clouds for New York in this creative and funny story.
- Humphrey, Margo. *The River That Gave Gifts: An Afro-American Story*. San Francisco: Children's, 1987. Children bring gifts to an elderly friend, and one is a special gift from the river.
- Keats, Ezra J. *The Snowy Day*. New York: Viking, 1962. This is a story about the adventures of a boy in the city on a very snowy day.
- Lewis, Richard, ed. *In a Spring Garden*. New York: Pied Piper, 1989. A beautifully illustrated book of haiku, including some about various forms of water.
- Locker, Thomas. *Where the River Begins*. New York: Dial, 1984. Grandfather and his grandsons find the source of the river that flows by their home.
- Lyon, George Ella. *Come a Tide*. New York: Orchard, 1990. A girl provides a lighthearted account of the spring floods at her rural home.
- Mendez, Phil. *The Black Snowman*. New York: Scholastic, 1989. By the power of an ancient, magical *kente*, a garment once worn by a tribal man of strength, a black snowman in the city comes to life and helps Jacob discover the beauty of his African heritage and his self-worth.
- Moore, Elaine. *Grandma's House*. New York: Lothrop, 1988. A girl visiting her grandmother in wintertime notices the changes winter brings.
- Peters, Lisa Westburg. *Good Morning, River!* New York: Arcade, 1990. Kate and her elderly friend Carl spend their days on the river, observing it in all seasons—its thick crust of ice in winter, the floodwaters that rise in the spring thaw, and more.
- _____. *Water's Way*. New York: Arcade, 1991. A simple story weaves in the phase changes of water. Whether water is rising from the ocean to become clouds, forming dew on the grass, or falling out of the sky in snowflakes, "water has a way of changing."
- Radin, Ruth Y. *High in the Mountains*. New York: Macmillan, 1989. Poems about water are included in this book of poetry for children.
- Shulevitz, Uri. *Rain Rain Rivers*. New York: Farrar, 1969. A child sits cozily indoors, observing the rain and thinking about where it goes.

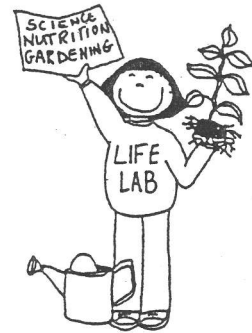
- Spier, Peter. *Noah's Ark*. New York: Doubleday, 1977. This book retells in pictures the tale of Noah, who gathered a pair of every creature on board his ark and thereby preserved them from the flood.
- _____. *Peter Spier's Rain*. Somerville, MA: Zephyr, 1982. In this wordless story, two children play in their backyard during a rainy day.
- Steig, William. *Amos and Boris*. New York: Farrar, 1971. A mouse and a whale help each other and become best friends.
- Yashima, Taro. *Umbrella*. New York: Viking, 1958. A Japanese girl anxiously awaits the rain in order to use her new birthday umbrella.
- Winthrop, Elizabeth. *Belinda's Hurricane*. New York: Puffin, 1989. This exciting story depicts a young girl in the midst of a hurricane.

Reference Books

- Branley, Franklyn. *Rain and Hail*. New York: Crowell, 1983. Here is a clear, easy-to-read account of the connections between clouds, rain, and water.
- _____. *Snow Is Falling*. New York: Crowell, 1986. This book illustrates both the benefits snow brings to plants, people, and other animals, as well as the hardships it creates.
- Dorros, Arthur. *Follow the Water from Brook to Ocean*. New York: Harper, 1991. Follow the progress of water as it flows from brook to stream to river, over waterfalls, through canyons and past dams to eventually reach the ocean.
- Krensky, Stephen. *Snow and Ice*. New York: Scholastic, 1989. A "Science Is Fun" book with easy activities that help children to observe properties of snow and ice.
- Parker, Steve. *Pond and River*. New York: Knopf, 1988. This photo essay examines the range of plant and animal life found in fresh water throughout the year.
- Russell, Naomi. *The Stream*. New York: Dutton, 1990. Here is an entertaining journey through the water cycle, starting with a cloudburst and ending at the ocean, where vapors rise once again into clouds. The book tells how humans and other animals are connected to the cycle.
- Simon, Seymour. *Oceans*. New York: Morrow, 1990. Beautiful photos accompany excellent text in this book about oceans, tides, and waves.
- Wilkin, Fred. *A New True Book: MATTER*. Chicago: Children's. This book presents properties of matter and some experiments demonstrating them.
- Wilkes, Angela. *My First Green Book: A Life-size Guide to Caring for Our Environment*. Knopf, 1991. These step-by-step environmental experiments are not only practical and persuasive, but dramatically illustrated as well.

Some of these books may be available in Spanish-language editions. Check with your local bookstore for Spanish titles currently in print and available by special order.

Date: _____



Dear Parent or Guardian:

For the next few weeks, we will be studying water as part of our Life Lab Science Program. We will be investigating water's physical properties and exploring how and why water changes form. There are a number of ways you can enhance your child's study of water:

- Whenever your child encounters water, ice, or steam, ask for observations and discuss any changes that are taking place. Is the ice melting? Is water boiling? Is steam condensing?
- Conduct your own experiments at home with water. Encourage your child to figure out ways to make ice melt faster or more slowly. Or you might boil the liquid to see how heat makes the water evaporate.

We would appreciate your collecting magazines, particularly nature-oriented magazines, for the class to use in various activities. Please send the magazines to school with your child by _____. As always, we would enjoy having your help at school with our Life Lab activities. If you can join us, please complete the form below and return it to me.

Sincerely,

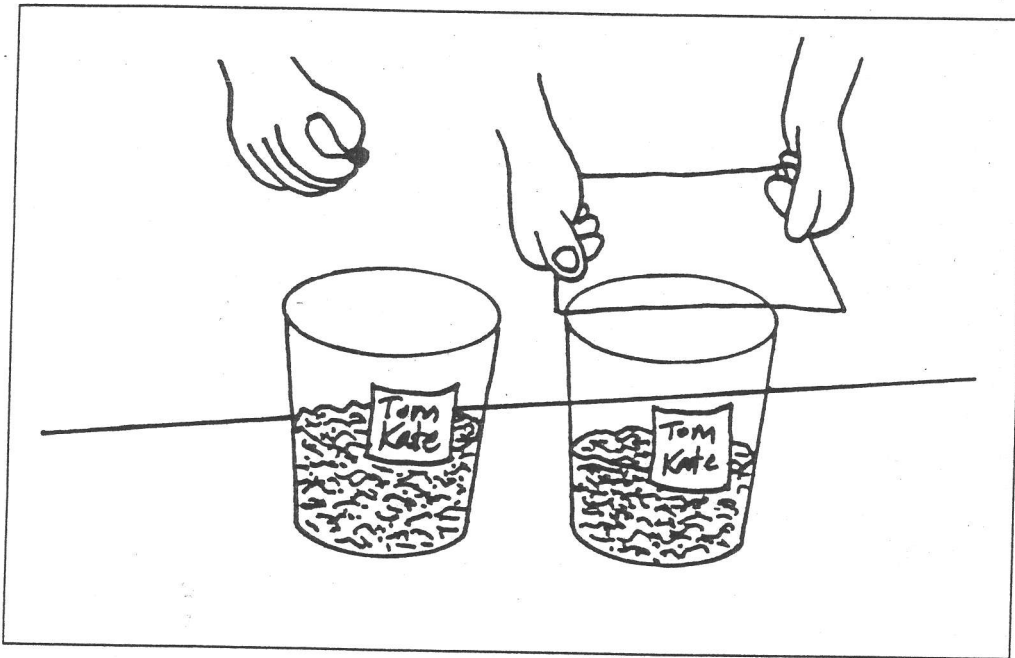
Name _____ Phone _____

Yes. I'd like to help in the classroom. Please call me.

No. I can't help, but please keep me informed.

Mini-Terrariums

Students plant and then water seeds in two cups, one covered and one uncovered. They predict what will happen to the seeds.



Outcome

Students apply their knowledge about evaporation and condensation.

For the Teacher

Students have now explored the idea that water can take three forms: liquid, solid, and gas. They have also investigated the idea that water evaporates and condenses. These concepts are not easy for children to understand. For example, accepting the concept that water can become a gas in the air may upset a long-held belief that water disappears. This activity will help students test their new knowledge of how water changes state, and provide students with an opportunity to apply their knowledge of condensation and evaporation to mini-terrariums. As students work, circulate among them and ask questions about what will happen to their terrarium.



Indoor or Outdoor



Time

Part 1: 30 minutes

Part 2: 20 minutes

Process Skills

Predicting

Applying



Materials

For the Class:

- What-We-Know-about-Water Chart
- Questions-about-Water Chart
- 2 clear plastic cups
- piece of clear plastic wrap
- newspaper
- 3 liters of moist potting soil
- 3 spoons or trowels
- 11" x 17" sheet of paper
- 6 radish seeds
- 2 spray bottles
- masking tape

For Each Pair:

- 2 clear plastic cups
- 6 radish seeds
- piece of clear plastic wrap
- rubber band
- Lab Book, pp. 41-42

Teacher to Teacher

Many students in my class thought that when water gets hot enough "it just goes away." After the investigations of the different phases of water, a lot of them decided that they wanted to revise their ideas. When we discussed the terrarium investigations, I was careful to give the scientists' understanding of condensation and evaporation as only one of the many ideas in the class. Then we discussed the pros and cons of each one based on what we had observed. That way I wasn't providing "ready-made" answers to the kids, and they felt their theories were valued.

—Helene Finkelman, Palmetto Elementary School, Miami, FL

Preparation

1. Prepare a sunny place in the classroom to store the mini-terrariums.
2. Cover a table with newspaper to use as a planting station. Set up planting materials at the station.
3. Place a 2-inch strip of masking tape on the side of each plastic cup.
4. Fill two of the plastic cups with soil to use in the Getting Started section.



Getting Started

Discuss how covering the cup with plastic will help keep the soil moist through condensation.

What do you think would happen to a plant if you watered it once and did not give it water again? What do you think would happen if we planted seeds in this uncovered cup and watered them only once? Why? Plant three seeds in the cup and water once. What would happen to the seeds if we watered them once and then covered the cup with plastic wrap? Why? Plant three seeds in a second cup and cover with plastic wrap. Have student pairs record their ideas on their lab sheets.



Part 1



Action

1. Divide the class into pairs. Give each pair 2 clear plastic cups labeled with tape. Instruct students to write their name on the tape.
2. Demonstrate how to:
 - fill cups halfway with soil;
 - plant seeds at the proper depth by making a hole the depth of a pencil point;
 - water the soil with the spray bottle;
 - secure the plastic wrap over the top of 1 cup with a rubber band.

3. Allow appropriate numbers to rotate through the planting station.
4. Give each pair 6 seeds to plant, 3 for each container.
5. Allow students to mist the soil with the water sprayer until the top of the soil is soaked. Then have them cover 1 cup with the plastic wrap. Leave the other uncovered.
6. Ask students to place their cups in a sunny location in the classroom.
7. Plan to check the mini-terrariums again in 2 weeks. Mark the date on the Garden Log as a reminder.



Assessment

Discuss with students what they think will happen to the seeds.

What did you predict would happen to the seeds in the uncovered cup? Why? What did you predict would happen to the seeds in the covered cup or mini-terrarium? Why?

Part 2 (two weeks later)



Action

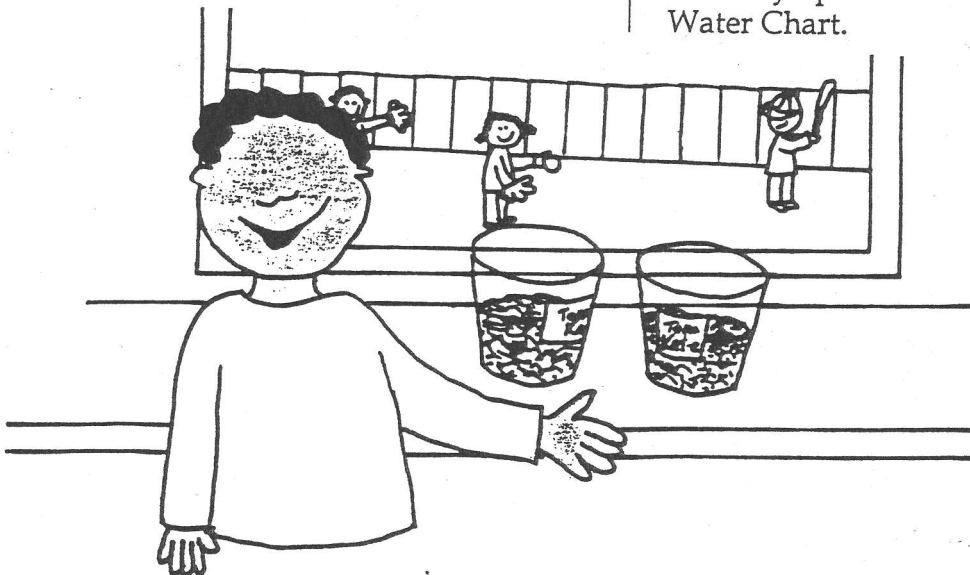
1. Ask students to check their mini-terrariums and then record the results on their lab sheet.
2. Write two headings on the chalkboard: Covered and Uncovered. Then record the number of sprouts in each set of cups. Record, too, how the soil felt in each cup. Which was still moist? Which was dry?



Assessment

Ask partners to explain to one another why they got the results they did.

What happened to the seeds in both cups? How did the seeds in the covered cup get enough water to grow? Did what happened surprise you? Why? What happened to the water in the uncovered cup? Have students add new ideas to the What-We-Know-about-Water Chart. Review and revise earlier information, if necessary. Ask if students want to add any questions to the Questions-about-Water Chart.



Digging Deeper

- Make a larger terrarium out of a fish tank or gallon jar. Place soil, plants, and small animals such as worms and snails in it. Seal the top and let students observe the terrarium at the Life Lab Center.
- If any seeds germinated in the mini-terrariums, cover the sides of these cups with dark paper to keep light off the roots. Remove the paper occasionally to observe the roots as the plant grows. As the plant becomes root-bound, discuss whether the plants need to be transplanted.
- In the garden make plastic coverings from gallon milk jugs for some of the plants. Test to see if they need less water than uncovered plants.

Teacher Reflections

- Did students make any reference to condensation or evaporation in their predictions?
- Did students use condensation or evaporation to explain what happened in the cups?
- Did students seem to understand how evaporation and condensation affect plants?

The Life Lab Scope and Sequence— A Full Program of Life, Earth, and Physical Sciences

The Life Lab Science Scope and Sequence demonstrates that Life, Earth, and Physical science concepts are integrated in a systems approach to science. As the garden grows and changes throughout the seasons, it provides a natural laboratory for studying how the science disciplines are interrelated. You will also discover numerous opportunities for integrating science with math, language arts, and social studies.

Life Lab Science		Grade 2		Change Around Us		Scope and Sequence	
	Theme Connections	Life Science	Earth Science	Physical Science	Process Skills		
Overview	<p>Change: Living and nonliving things change. There are patterns of change in the natural world. The garden is a model of an environment that is always changing.</p> <p>Living things need resources to survive and change. Resources change as they are used, recycled, or depleted.</p>	<p>Living things can be distinguished from nonliving things.</p> <p>Living things change in patterns called life cycles.</p> <p>Living things need certain resources from their environment to survive and grow.</p>	<p>The Earth, its atmosphere, and the sun provide resources for living things to grow.</p> <p>Nonliving resources go through patterns of change.</p> <p>Humans can conserve and recycle the Earth's limited resources to limit our impact on the environment.</p>	<p>Living and nonliving things have properties that we can observe, define, and record.</p> <p>Water changes form.</p> <p>Air occupies space and has weight. Air moves and changes.</p> <p>Energy changes things.</p> <p>The sun is a source of energy.</p> <p>Change can be measured.</p>	<p>Predicting—Students make simple predictions based on observations.</p> <p>Categorizing—Students learn to categorize observations.</p> <p>Communicating—Students develop communication skills through drawing, writing, and discussing with their peers and teachers.</p>		
Sensing Changes	<p>Change: Living things change and have characteristics that distinguish them from nonliving things.</p>	<p>We use our senses to discover the physical properties of objects, and to determine similarities and differences.</p>	<p>The garden provides resources for things that live there.</p>	<p>Living and nonliving things have properties that we can observe, define, and record.</p>	<p>Sort objects according to common properties.</p> <p>Share ideas and observations.</p>		
Investigating Plants	<p>Change: Plants are living things and need certain resources to grow. Plants change as they grow.</p> <p>There is a pattern of change, or a life cycle, in plant development.</p>	<p>Plants are living things. Plants need certain resources from their environment to grow.</p>	<p>The Earth, its atmosphere, and the sun provide resources such as soil, water, air, and energy for plants to grow.</p>	<p>We can measure changes in plants as they grow.</p>	<p>Describe changes that occur in objects, based on observations.</p> <p>Make simple predictions based on observations.</p> <p>Record information and communicate results.</p>		

Life Lab Science		Grade 2		Change Around Us		Scope and Sequence	
	Theme Connections	Life Science	Earth Science	Physical Science	Process Skills		
Investigating Water	<p>Change: Water changes form.</p> <p>Water goes through a pattern of change called the water cycle.</p> <p>Water is a natural resource needed by all living things.</p>	All living things need water to grow.	<p>Most of Earth is covered by water.</p> <p>Water continually moves through the water cycle.</p>	Water has observable properties. Water changes form, from solid to liquid to gas. Heat energy causes water to change form.	<p>Observe changes.</p> <p>Record predictions about a change based on prior observations.</p> <p>Categorize by similarities and differences.</p> <p>Communicate ideas with peers through writing, drawing, and discussing.</p>		
Investigating Air	<p>Change: Air is a non-living resource that living things need.</p> <p>Air changes. Air moves and can move things.</p>	Almost all living things need air to grow.	Air surrounds the Earth.	<p>Air has properties that can be observed and recorded.</p> <p>Air occupies space, and has weight. Air moves and changes; we can measure some changes.</p>	<p>Make a simple prediction about a change based on observations.</p> <p>Categorize according to properties.</p> <p>Communicate ideas with peers through writing, drawing, and discussing.</p>		
Investigating Food	<p>Change: Living things need food to grow and stay healthy. Energy in food is changed to energy used to grow and move.</p> <p>Food changes as it is processed.</p>	<p>Food is a resource that humans need. Food comes from plants and animals.</p> <p>Humans get energy and nutrients from food.</p>		<p>Food changes as it is processed.</p> <p>Food gives us energy.</p> <p>Energy is necessary to make things work.</p>	<p>Gather information to make a prediction.</p> <p>Observe changes.</p> <p>Categorize into groups and subgroups.</p> <p>Report ideas as a team.</p>		

Life Lab Science

Grade 2

Change Around Us

Scope and Sequence

	Theme Connections	Life Science	Earth Science	Physical Science	Process Skills
Investigating Food Chains	<p>Change: The garden is an environment that is always changing. There are patterns of change within the garden. Living things change in the garden.</p>	<p>Living things need energy and nutrients to survive. Energy and nutrients are passed through the food chain. Plants make their own food. Animals get food energy by eating plants or other animals.</p>	<p>The physical environment provides resources that living things need.</p>	<p>The sun is a source of energy. Energy is necessary to make things work.</p>	<p>Predict and communicate changes. Categorize living things. Record observations through drawing and writing. Communicate information and results as a group.</p>
Investigating Resources	<p>Change: Humans use natural resources for many different purposes. Humans change resources as they use them. Natural resources go through patterns of change. The amount of natural resources can change; some natural resources can be used up.</p>	<p>Living things need certain resources to survive and grow. Humans use plants and animals as resources. The Earth has a limited amount of natural resources.</p>	<p>Everything humans use originates from natural resources. Human use of resources affects the physical environment.</p>	<p>We use technology to change resources for our use.</p>	<p>Formulate a testable question. Categorize objects according to their characteristics. Communicate ideas and plans. Record information in writing and drawing.</p>
Conserving Resources	<p>Change: Resources change as they are processed and used. Humans can change the physical environment. Humans can conserve natural resources.</p>	<p>Living things are interdependent. Human use of resources has an impact on other living things. Wise resource use will save resources for other living things.</p>	<p>Human use of resources has an impact on the physical environment. Humans can conserve and recycle the Earth's limited resources.</p>	<p>Conserving resources saves energy.</p>	<p>Make predictions based on acquired knowledge. Use Guess-Test-Tell to create a class experiment. Develop categories to group objects and events. Record observations in drawing and writing.</p>

Life Lab Science

Change Around Us



Developed by Life Lab Science Program



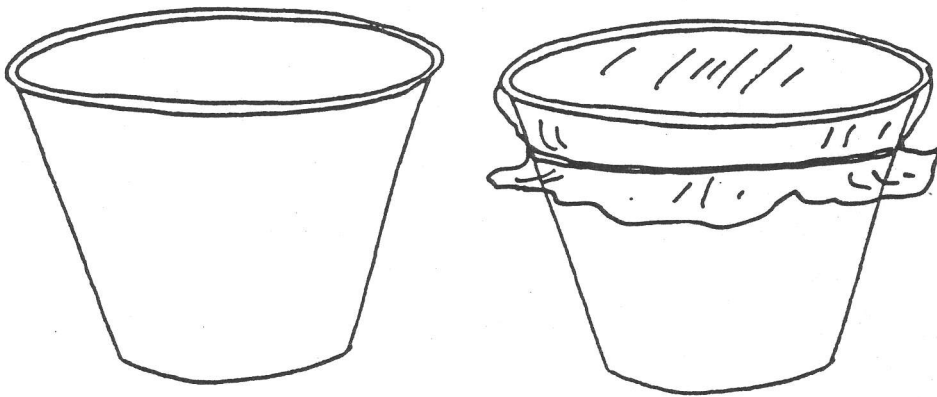
VIDEORECORDING

Mini-Terrariums

Names _____ Date _____

GUESS

Draw what you think will happen to the seeds in the two cups.



Why do you think this will happen?

TEST

Tell how you will test your ideas.

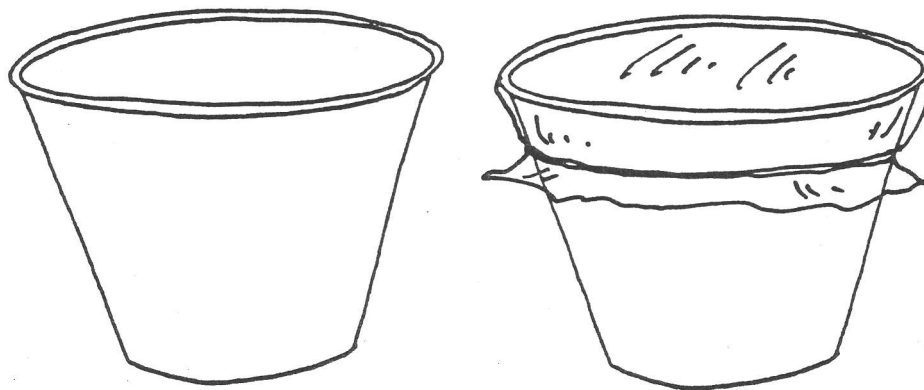
List what you did to cup 1.

List what you did to cup 2.

TELL

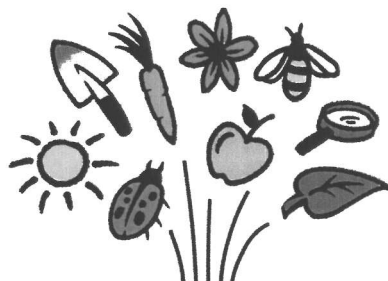
Date _____

Draw what happened to the seeds in the two cups.



How does the soil feel in cup 1?

How does the soil feel in cup 2?



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