Investigating Water

Teacher's Guide

Marvelous Explorations through Science and Stories

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Teacher Background Information

What is the focus of this Guide?

This guide engages children in the process of scientific inquiry using the context of a favorite early childhood pastime—water play!

What science concepts are covered in this Guide?

- We learn about our world by observing, questioning, investigating, describing, and discussing our findings.
- We use tools to collect data and extend our senses.
- All living things need water.
- Water takes the shape of its container.
- Water clings to itself.
- Water behaves differently on different surfaces.
- Water changes its form reversibly.
- Water flows.
- Water takes up space.
- Water has weight.
- Some objects float in water and some objects sink.
- Some things mix with water and other things do not.

What is scientific inquiry?

Scientific inquiry is driven by curiosity and wonder. It begins when we notice something that leads us to ask questions: *"Why?" "What's going on?" "How does that work?"* The next step is to search for answers through observation, collecting and recording data, making representations of results, and drawing upon books and the expertise of others to further our understanding. Scientific inquiry rarely proceeds in a purely linear fashion. It is a back-and-forth process where new discoveries suggest other questions to pursue.

Why introduce children to science process skills during early childhood?

Science process skills (e.g., observing, questioning) overlap considerably with the skills needed to succeed in school. The process skills used in science are critical as children learn to read. The same problem solving skills are used to navigate the social world as well.

What can I do to support children's inquiry?

Children have been learning by playing with water for as long as we can remember. We now know, however, that adults can help children explore water more productively by:

- designing a stimulating environment,

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- focusing attention,
- asking questions to guide exploration,
- encouraging children to express their ideas in words and drawings,
- helping make connections between actions and results,
- showing enthusiasm, and
- modeling curiosity.

What are the properties of water?

Water flows. One property of liquid water is that it flows. Because of gravity, water naturally flows down, but it can be made to move upward—as when we suck on a straw—if enough force is applied.

Water clings to itself. Water molecules are attracted to one another. This attraction is called **cohesion**. To observe this attraction, squeeze small drops of water onto wax paper. As you pull the drops closer together, they will merge into one larger drop. This larger drop will resist being divided. If you gently press on the drop with your finger, it will flatten but it will not break.

Surface tension results from the attraction among water molecules at the surface. Surface tension creates a skin-like barrier between air and the water molecules below. You can observe surface tension by pouring water into a glass until it is very full. If you look carefully, you will see a dome over the rim of the glass. Surface tension keeps the water from spilling over. The surface tension of water is strong enough to support insects travelling on top of the water. Soap and oil weaken surface tension by reducing the strength of the attraction between water molecules.

Water behaves differently on different surfaces. Adhesion is the attraction of water molecules to other materials. Water is more strongly attracted to some materials than others, depending on their composition. When water sticks to something such as a paper towel, the drops are pulled apart. This is the property of water that makes things wet. Another property of water is that it can move into other materials. Water is readily absorbed by materials that have a lot of air pockets to hold the water. Dry materials also absorb more water than things that are already wet.

Water changes its form reversibly. Water is found in three forms–**solid, liquid**, and **gas**. Because water in its gaseous state is invisible, this form of water is difficult for young children to comprehend. They can, however, observe **evaporation**, the process that changes water into a gas. This process requires heat. Heat makes the water molecules move apart and break free of the bonds that hold them together, resulting in a gas. The warmer the water, the more quickly it will evaporate.

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Young children can more readily understand that water can change from a solid (ice) to a liquid and back again through the processes of melting and freezing. Water normally freezes at 32° Fahrenheit (0° C).

Water takes the shape of its container. Another important property of water is that—like other liquids—it can change its shape but not its volume. This property is known to be confusing to young children who almost always believe that a tall, skinny glass of their favorite beverage holds more than a short, wide one! Experts believe that the tendency of young children to focus on one single dimension (height) rather than two (height and width) underlies this misunderstanding. Talking with children as they pour water into containers of different sizes and shapes can help facilitate the development of this concept (which will emerge during the early years of elementary school).

Water takes up space. Some children may be surprised to discover that water takes up space. This is easily demonstrated by placing solid objects in a container of water. As the objects displace the water, the water level rises.

Water has weight. As is obvious to anyone who has tried to lift a bucket of water or basket of wet laundry, water has weight. The weight of water also is responsible for **water pressure**. Water pressure is the force that water exerts on things. Water flows farther and faster from a hole when more water is pressing on it than when less water is pressing on it.

Some objects float in water and some objects sink. Children may initially believe that all heavy objects sink while all light objects float. In fact, several factors determine whether an object will sink or float. (Consider the huge ships that travel the oceans.) An object that is hollow and filled with air will float; so will an object whose size and shape spread it out over the surface of water. (We sink when we try to stand in deep water but float if we lie on its surface.)

Whether an object sinks or floats depends on its **density** relative to the density of water. Something will float if it is less dense than water. This means that the substance weighs less than an equal amount of water. Air is less dense than water, so things that are filled with air will float. Pouring water into an object or adding weight by some other means can make it sink.

Some things mix with water and others things do not. For example, if you mix vinegar and water–both liquids–you end up with a vinegar-water solution. But if you mix cooking oil or corn syrup–also liquids–with either vinegar or water, they may mix for a moment, but eventually will separate into layers.

Solids also respond differently when mixed with liquids. Sugar and salt will **dissolve** in water. Other solids–such as sand or cornstarch–will not. When substances mix together, they are called a solution. When substances do not mix (e.g., vinegar and oil, sand and water), they are called a **suspension.**

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What measures should I take to make sure that the experiences in this Kit are safe for young children?

Water experiences can pose potential hazards for young children, so it is critical to supervise the children at all times. Additional steps to ensure a safe environment for investigation include:

- clean, disinfect, and fill the water table with fresh water daily
- wash and disinfect water tools on a daily basis
- require children to wash their hands before playing at the water table
- monitor spills carefully to prevent accidents

Teacher Vocabulary

adhesion – the attraction of molecules to other materials

cohesion – the attraction of molecules to each other

density – the mass of a substance divided by its volume

displace – to take the place of something else

dissolve – to mix with a liquid so that the result is a liquid that is the same throughout

evaporation – when a liquid changes into a gas

gas – an invisible substance that has no shape and spreads to fill any space

liquid – a substance that can change its shape but cannot change its volume

molecule – a small substance composed of two or more atoms such as hydrogen and oxygen (e.g., a molecule of water)

solid – a material that keeps its shape

solution – a uniform mixture of two or more substances; salt water is a solution

suspension – a liquid or gas containing small solid particles that will settle upon standing; muddy water is a suspension

surface tension – a force that pulls drops of water or other liquids together making a skin on the surface

volume – the amount of space something takes up

water pressure – the force that water exerts on things

Materials Needed for Core and Center Experiences

Materials	Books
Experience 1: What Is Water? water tools—select from: basters bucket sieves funnels liter containers plastic tubing water pump pump bottles sponges spray bottle squirt bottles water wheel watering can water smocks water table towels or mop for clean-up	*I Am Water* by Jean Marzollo *Splish Splash* by Joan Bransfield Graham *Water, Water* by Eloise Greenfield
Experience 2: Why Is Water Important? photos of animals drinking water photos of living and nonliving things	*Precious Water* by Brigitte Weninger and Anne Möller *The Water Hole* by Graeme Base *I Am Water* by Jean Marzollo *A Cool Drink of Water* by Barbara Kerley *Drinking Water* by Mari C. Schuh *Water as a Liquid* by Helen Frost
Experience 3: What Is the Shape of Water? container of water plastic tubing funnels liter containers assortment of containers of various sizes and shapes flat surface or shallow pan water smocks towels or mop for clean-up	*What Is a Scientist?* by Barbara Lehn *I Get Wet* by Vicki Cobb *Being a Scientist* by Natalie Lunis and Nancy White *Curious Kittens* by Roy Volkmann *Puddles* by Jonathan London

Materials Needed for Core and Center Experiences

Materials	Books
Experience 4: Exploring Water Drops	
pipettes wax paper photos of water drops containers of water food coloring (optional)	*I Love the Rain* by Margaret Park Bridges *Raindrops* by Larry Dane Brimner
Experience 5: Measuring Water	
1-, 2-, & 4-cup measuring cups water smocks water table containers of different sizes	*What Is a Scientist?* by Barbara Lehn *Why We Measure* by Lisa Trumbauer
Experience 6: Absorption	
measuring cups dry sponges container of water other materials to test (e.g., paper towels, fabric, wood, plastic)	*I Get Wet* by Vicki Cobb *Puddles* by Jonathan London
Experience 7: Evaporation	
clear liter container wet paper towel tray or other non-absorbent surface warm, sunny place	*Puddles* by Jonathan London *The Puddle* by David McPhail *Where Do Puddles Go?* by Fay Robinson
Experience 8: Ice Melts	
ice plate or shallow container	*Solids, Liquids, and Gases* by Angela Royston *I Am Water* by Jean Marzollo *Snow* by Uri Shulevitz *The Snowy Day* by Ezra Jack Keats
Experience 9: Exploring Water Flow I	
water tools water tool photos water smocks water table towels or mop for clean-up	*What Is a Scientist?* by Barbara Lehn *Puddles* by Jonathan London

Materials Needed for Core and Center Experiences

Materials	Books
Experience 10: Exploring Water Flow 2 water flow cups water smocks water table towels or mop for clean-up	*Splish Splash* by Joan Bransfield Graham *Water Dance* by Thomas Locker
Experience 11: Does Water Take Up Space? large measuring cup rocks marker or tape towels or mop for clean-up	*Mr. Archimedes' Bath* by Pamela Allen *King Bidgood's in the Bathtub* by Audrey Wood
Experience 12: What Does Water Weigh? balance scale rocks container of water assortment of solid objects	*Just a Little Bit* by Ann Tompert *How Heavy Is It?* by Brian Sargent
Experience 13: Exploring Floating and Sinking 1 floating and sinking collection ship photo materials for charting results clear container of water	*10 Little Rubber Ducks* by Eric Carle *The Puddle* by David McPhail *Ducky* by Eve Bunting
Experience 14: Exploring Floating and Sinking 2 floating/sinking tubes assortment of small items measuring cup water	*Who Sank the Boat?* by Pamela Allen *Umbrella* by Jan Brett

Materials Needed for Core and Center Experiences

Materials	Books
Experience 15: Mixing Liquids test tubes with covers measuring cup food coloring water vinegar oil other liquids (optional)	*Solids, Liquids, and Gases* by Angela Royston
Experience 16: Dissolving test tubes with covers oil & vinegar test tubes from Experience 15 water sugar cornstarch, flour, or sand plastic cups spoons	*Solids, Liquids, and Gases* by Angela Royston

Experience 1

What Is Water?

Science Concept
Water flows.

Aim
Children will explore water using a variety of objects.

Materials
water tools
water smocks
water table
towels or mops for clean-up

Books
I Am Water by Jean Marzollo
Splish Splash
by Joan Bransfield Graham
Water, Water by Eloise Greenfield

Vocabulary
baster
bottle
bucket sieve
dropper
explore
flow
funnel
in
out
pump
sponge
spray
squeeze
squirt
tube

Approach
- In advance, prepare the water table. Experiment with the water tools so that you will be able to effectively facilitate the children's explorations. Establish "water table rules" to ensure safe explorations.
- Encourage the children to talk about what they already know about water. Ask: *What does water look like? What does water feel like? What does water sound like? Where does water come from? What do we use water for?*
- Gather small groups of children around the water table and give each child a different water tool to explore. As the children explore the tools, ask questions such as: *What do you see? What is happening? How did you get the water in there? How is it getting out?*
- Rotate the tools among the children to encourage further exploration. Continue to prompt the children to describe what they are doing and what they observe.

Extension

Throughout the day, draw the children's attention to how water moves through faucets, hoses, and sprinklers and when poured from pitchers and watering cans.

Integrated Experiences

Literacy 1: Record and display the children's ideas about water.

Literacy 2: Take photographs of the water tools. Label the photographs. Use the photographs to support conversations about the children's explorations throughout the unit.

Literacy 3: Create a classroom display depicting different bodies or sources of water. Add labels.

Literacy 4: Begin a class science log using photographs to document the children's explorations of water.

Experience 2

Why Is Water Important?

Science Concept
All living things need water.

Aim
Children will learn that water is important for all living things.

Materials
photos of animals drinking
photos of living and nonliving things

Books
Precious Water by Brigitte Weninger and Anne Möller
The Water Hole by Graeme Base
I Am Water by Jean Marzollo
A Cool Drink of Water by Barbara Kerley
Drinking Water by Mari C. Schuh
Water as a Liquid by Helen Frost

Vocabulary
drink
healthy
living
nonliving
rain
thirsty

Approach
- In advance, review the photo sets so that you can effectively lead the discussion.
- Begin this experience by having the children engage in a vigorous physical activity such as dancing, jumping, or running on the playground.
- Encourage the children to think about what it feels like to be hot and thirsty. Ask the children: *When you are hot and thirsty, what do you do?* Talk about how we need to drink water every day to be healthy.
- Ask the children to share their ideas about other living things that need water. Encourage the children to think about any pets they might have. Show them pictures of animals drinking.
- If the children do not think of plants, ask them if they think plants need water to stay alive. Explain that rain often provides plants with water, but that sometimes we need to water plants to help them stay healthy.
- Using the photos of living and nonliving things, talk about how all living things need water to stay healthy.

Extension

Take a walk around the classroom and playground and note all the living things that need water and how they get the water they need.

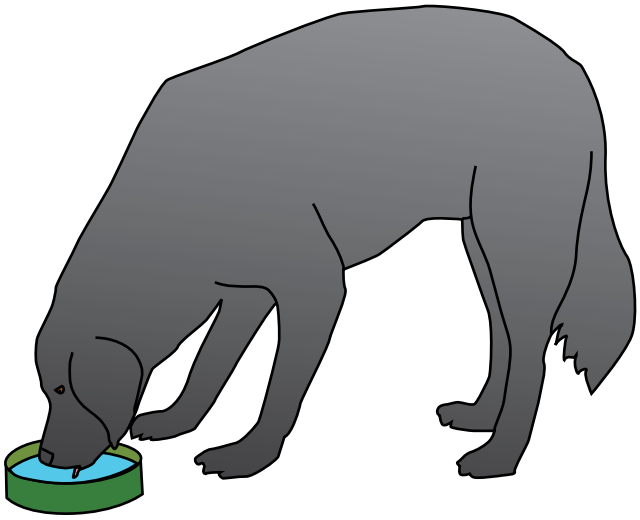
Science Center

Place the photos of living and nonliving things in the Center and encourage the children to sort them into groups that do or do not need water.

Integrated Experiences

Literacy: Create a class display using words and pictures of living things that need water to survive.

Physical Health and Development (Health): Talk about the ways we use water to maintain good health (e.g., brushing teeth, washing hands and dishes, drinking water).



Experience 3

What Is the Shape of Water?

Science Concept
We learn about our world by observing, questioning, investigating, describing, and discussing our findings.

Water takes the shape of its container.

Aim
Children will investigate how water changes shape.

Materials
container of water
plastic tubing
funnels
liter containers
assortment of containers of various sizes and shapes
flat surface or shallow pan
water smocks
towels or mops for clean-up

Books
What Is a Scientist? by Barbara Lehn
I Get Wet by Vicki Cobb
Being a Scientist by Natalie Lunis and Nancy White
Curious Kittens by Roy Volkmann
Puddles by Jonathan London

Vocabulary
circle
explore
flat
pour
scientist
shape
short
spread
square
tall

Approach
- In advance, experiment with available containers so that you can demonstrate the concept clearly.
- Distribute the containers among small groups of children. Ask the children to partially fill the containers with water. Encourage the children to describe the shape that the water takes using words such as round, circle, and square.
- Explain that you are going to explore what happens to the shape of water when it is poured onto something flat.
- Carefully empty one of the containers into a shallow pan. Ask: *Is the water the same shape as it was before? What was its shape before? What is its shape now?* Draw the children's attention to the way the water spreads when poured on a flat surface. Explain that water has no real shape, but rather takes the shape of whatever it is in.
- Explain that you are now going to pour the water back into the container. Ask: *Will the water go back to the old shape? Or will it stay flat?*
- Pour the water back into the container. Talk about how the water now has the shape that it did before.

Extension

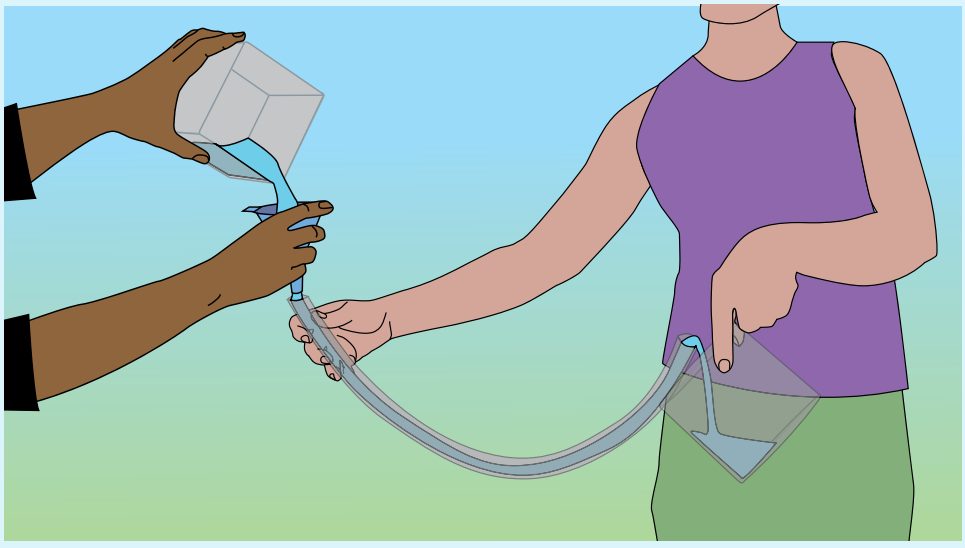
Repeat the experience using other containers of various shapes and sizes. Try containers such as bear-shaped honey bottles or wacky curly straws. Discuss and describe the shape water takes in these containers.

Integrated Experiences

Literacy: Create a class display that shows the different shapes that water can take using children's drawings and photographs.

Math: During the investigation, use words to describe shape and relative size (big, bigger, biggest).

- Repeat with a different container. Ask: *Do you think the water will spread out like it did before or if it will keep its shape?*
- Encourage the children to describe what happens to the shape of water as they pour it from one container to another.
- Tell the children that they are being scientists when they try out different ways to find answers to questions.



Experience 4

Exploring Water Drops

Science Concept
Water clings to itself.

Aim
Children will make and manipulate water drops.

Materials
containers of water
pipettes
photos of water drops
wax paper
food coloring (optional)

Books
I Love the Rain
by Margaret Park Bridges
Raindrops
by Larry Dane Brimner

Vocabulary
drop
large
pipette
round
small
wax paper

Approach
- In advance, experiment with making water drops on wax paper so that you can effectively guide the children's explorations. Cut a small square of wax paper for each child.
- Begin by asking the children to share what they already know about water drops. Ask questions such as: *How would you describe a water drop? Where have you seen water drops? Where do water drops come from?* Show the children the pipettes and wax paper and explain that they are going to explore water drops.
- In small groups, give each child a pipette and sheet of wax paper. Place a container of water nearby. Demonstrate how to make drops of water on the wax paper and encourage each child to do the same. Instruct the children to look at the drops from above and from the side to see the shape of the drop. Help them identify the shape as round. Compare the drops to those shown in the water drop photographs.
- Encourage the children to experiment. Guide their explorations by asking questions such as: *How can you make little drops? How can you make a big drop? What happens when you move the drops close together?*

Hint!
It is easier to observe the drops if you tint the water with food coloring.

Extension 1

Explore how to make drops using hands, fingers, and other tools such as spray bottles and basters.

Extension 2

Experiment making water drops on different surfaces such as the table top, foil, paper, or sand.

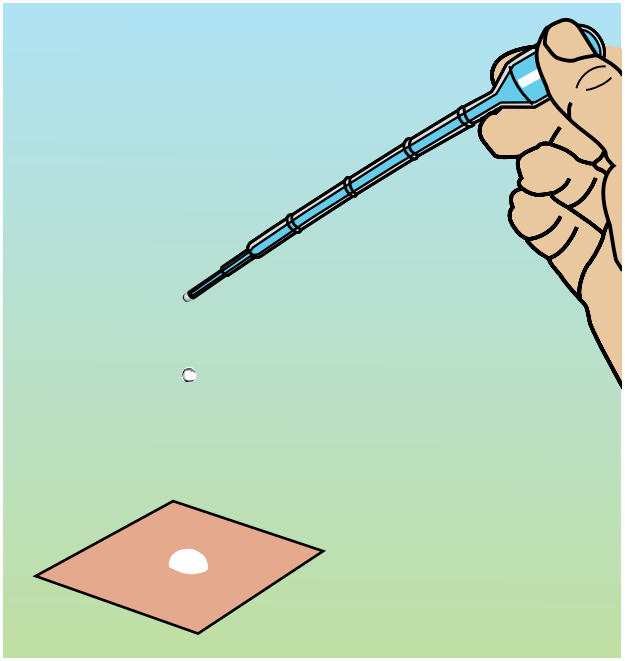
Integrated Experiences

Literacy 1: Take photos of children's explorations of water drops. Add to the class science log.

Literacy 2: Have the children represent the water drops they created using clay.

Math 1: During the investigation, have the children compare the size of individual drops to the size of drops pushed together.

Math 2: During the investigation, direct the children to make a specific number of drops or count the drops they make.



Experience 5

Measuring Water

Science Concept
We use tools to collect data and extend our senses.

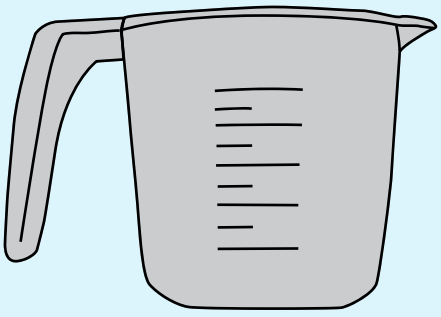
Aim
Children will use measuring cups to measure water.

Materials
1-, 2- and 4-cup measuring cups
water smocks
water table
containers of different sizes

Books
What Is a Scientist? by Barbara Lehn
Why We Measure by Lisa Trumbauer

Vocabulary
measure
measuring cup

Approach
- Show the children the measuring cup and introduce the term *measuring cup*. Ask the children if they have ever seen or used measuring cups and, if so, to describe their experiences.
- Draw the children's attention to the numbers and lines on the sides of the cup. Explain that the markings on the side of the cup help us know how much water is in the cup.
- Help the children explore how many cups of water it will take to fill the 2- and 4-cup measuring cups: *Here we have 1 cup of water. How many cups of water will it take to fill up this cup?*



- Compare the actual number of cups of water that were required to fill the container with the children's estimations. Repeat with the other measuring cup and containers of different sizes.
- Explain that scientists use tools such as measuring cups to measure and compare things.

Extension

Using small and large liter cylinders, explore how the same amount of water looks different in containers of different sizes.

Integrated Experiences

Math 1: Place the containers in order from the one that holds the fewest cups to the one that holds the most cups.

Math 2: Graph the number of cups required to fill each of the containers.

Math 3: Place a measuring cup or rain gauge outdoors to measure the amount of rainfall.

Creative Arts (Dramatic Play): Place measuring cups and spoons and a water pitcher in the dramatic play area to encourage pretend cooking, tea parties, and the like.

Experience 6

Absorption

Science Concept
Water behaves differently on different surfaces.

Aim
Children will investigate how water behaves on different surfaces.

Materials
measuring cups
container of water
dry sponges
other materials to test (e.g., paper towels, fabric, wood, plastic)

Books
I Get Wet by Vicki Cobb
Puddles by Jonathan London

Vocabulary
absorb
dry
investigate
soak
sponge
wet

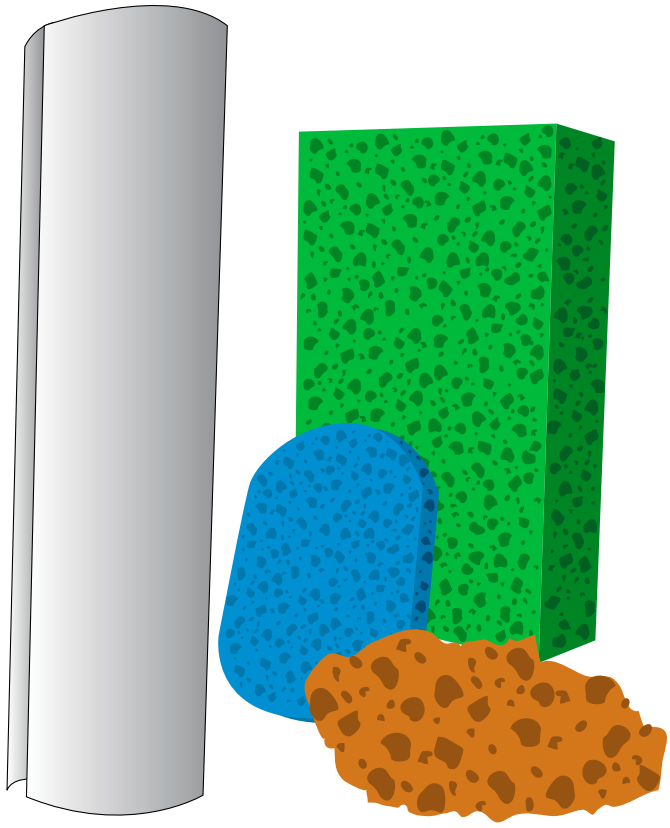
Approach
- In advance, practice this experience so that you know how much water is required given the types of sponges and measuring cups you will be using.
- In small groups, show the children the sponges and ask them to share what they already know about sponges: *This is a sponge. Have you ever seen one of these before? Where? What do we use sponges for?* Pass a dry sponge among the children and ask them to describe how the sponge feels. Explain that they are now going to investigate what happens when the sponge gets wet.
- Pour one cup of water in a measuring cup. Mark the water level with tape or a marker. Ask: *What will happen to the sponge when we put it in the water? What will happen to the water?* Have a child place a dry sponge in the water.
- Remove the sponge from the water. Focus the children's attention on the new water level: *Look, the water used to be up here, now it is down here. Where did the water go?*
- Have the children feel the wet sponge. Squeeze some water from the sponge, Draw the children's attention to the holes in the sponge and explain that these holes allow the sponge to absorb water.
- Repeat the steps with the wet sponge. Talk about why the wet sponge will not absorb as much water as a dry sponge.
- Place a variety of materials such as paper towels, cotton balls, fabric, and toys at the water table to encourage further exploration of absorption.

Extension 1

Explore absorption further by using pipettes to drop water on dry sponges, paper towels, and other materials.

Extension 2

⚠ Be sure to check for food allergies and complete any necessary paperwork. Place different dried fruits (e.g., raisins, apricots, cranberries) in different containers of warm water for 10 minutes. Compare the size and texture of the items before and after soaking.



Integrated Experiences

Literacy: At the beginning of the investigation, write down what children share about sponges. At the end of the investigation, record what children say they have learned.

Creative Arts 1 (Art): Mix food coloring and water in muffin tins. Squeeze drops on coffee filters. Observe as the color moves through the filter.

Creative Arts 2 (Art): Cut sponges into small pieces and have the children make sponge paintings.

Creative Arts 3 (Dramatic Play): Place an assortment of sponges, rags, spray bottles, and related props in the dramatic play area to encourage play about cleaning (e.g., washing a car).

Creative Arts 4 (Dramatic Play): Place an assortment of sponges, soaps, and towels at the water table to encourage the children to pretend to wash and dry baby dolls.

Experience 7

Evaporation

Science Concept
Water changes its form reversibly.

Aim
Children will investigate evaporation.

Materials
wet paper towel
large liter container
tray or other non-absorbent surface
warm, sunny place

Books
Puddles by Jonathan London
The Puddle by David McPhail
Where Do Puddles Go? by Fay Robinson

Vocabulary
disappear
dry
evaporate
experiment
puddle
rain
wet

Approach
- In advance, perform this experiment yourself so that you know what to expect.
- Introduce this experience by talking about rain: *What is rain? What does the ground look like when it rains? What are puddles? Where do the puddles go after the rain? What happens if we stand in the rain? What happens to our wet clothes when the sun comes out? When our clothes dry, where does the water go?*
- Explain that you are going to investigate where water goes when things dry. Wet a paper towel with water. Place the wet paper towel on a plastic tray or other hard flat surface. Place a clear empty plastic container upside-down over the paper towel.
- Ask the children: *What do you think will happen to the wet paper towel? What will happen to the container? Will we be able to see where the water goes?* Set the materials in a warm, sunny spot.
- With the children, check the container every 5 to 10 minutes. Draw the children's attention to what is happening to the paper towel and inside the container: *What do you see on the top of the container? How did it get there? What do you think the paper towel will feel like now?*
- Explain that the sun warmed the water so that it broke up into tiny pieces and went into the air. Talk about how there is always water in the air, but that we usually cannot see it because the pieces of water are so tiny. This experiment shows that the water is still there!

Extension

Make a puddle in the sun and outline with chalk or a piece of string. Have children observe how the puddle gets smaller over time.

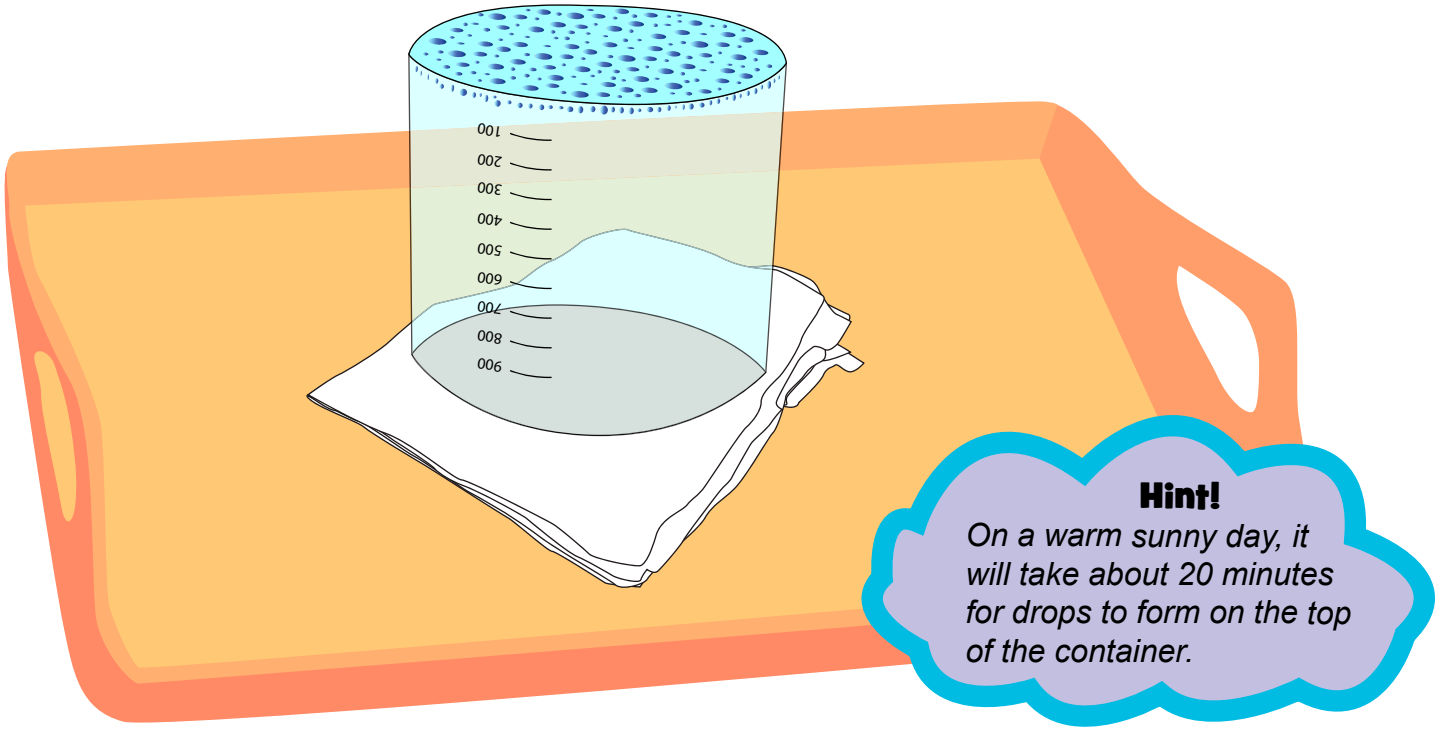
Integrated Experiences

Literacy: Have each child draw a picture showing what things (e.g., grass, sidewalk, animals) look like after a rain storm. Write each story and/or label the objects in the picture.

Creative Arts 1 (Art): Give each child a round coffee filter. Have the children draw on their filters with washable markers. Gently mist their finished drawings. Discuss what happens when the colors get wet. Watch as the water evaporates.

Creative Arts 2 (Art): Locate a safe sidewalk or paved area outdoors. Provide the children with buckets of water and large paintbrushes. Let the children "paint" huge pictures and discuss why their pictures eventually disappear.

Creative Arts 3 (Music and Movement): Sing the "Itsy Bitsy Spider."



Hint!

On a warm sunny day, it will take about 20 minutes for drops to form on the top of the container.

Experience 8

Ice Melts

Science Concept
Water changes its form reversibly.

Aim
Children will observe melting.

Materials
ice
plate or shallow container

Books
Solids, Liquids, and Gases by Angela Royston
I Am Water by Jean Marzollo
Snow by Uri Shulevitz
The Snowy Day by Ezra Jack Keats

Vocabulary
cold
freeze
ice
liquid
melt
solid

Approach
- In advance, make ice.
- Pass the ice around the group. Encourage the children to share any experiences they have had with ice: *What is this? Where do we find ice? What do we use ice for?* Encourage the children to describe how the ice feels.
- To set up the investigation, ask questions such as: *What do you think will happen if I leave the ice sitting out on this table? Will the ice still be there after lunch? Will the ice still be there tomorrow?*
- Leave the ice on a plate. Encourage the children to check on the ice and describe what they observe *(e.g., The ice is getting smaller. It looks like there is more water now.)*
- Make sure that all the children see the ice at least once while it is melting and then after it has melted completely. Explain that ice is solid water and that, when it gets warm, it melts and turns back into liquid water. Encourage the children to think about what would happen to the water if you put it in a very cold place such as a freezer.

Hint!
Plan ahead. It can take 30 minutes for an ice cube to melt if it is not in a warm spot!

Extension 1

Experiment with how different conditions influence how fast ice melts (e.g., sunny spots vs. shade, inside the classroom vs. outside). Discuss why the ice melts at different rates in these locations.

Extension 2

Add large blocks of ice and ice cubes to the water table for further exploration of ice.

Integrated Experiences

Literacy 1: Use words, photographs, and illustrations to record the children's investigations of freezing and melting in a class science log.

Literacy 2: Using words and pictures, have the children describe icy things they like to eat.

Math 1: Use the balance scale to compare the weights of ice and an equal amount of water.

Math 2: Compare the temperature readings of a thermometer placed in a container of water with one placed in a container of ice.

Creative Arts (Art): Fill ice cube trays with diluted tempera paints. Put a toothpick or popsicle stick in each section. When frozen, have the children "paint" a picture with the colored ice cubes.

Physical Health and Development (Gross Motor): Have the children play a game of "Freeze." Have the children move around until a volunteer calls out "freeze." All the children should stop in place. On a later date, substitute music stopping as the signal to freeze.

Experience 9

Exploring Water Flow I

Science Concept
Water flows.

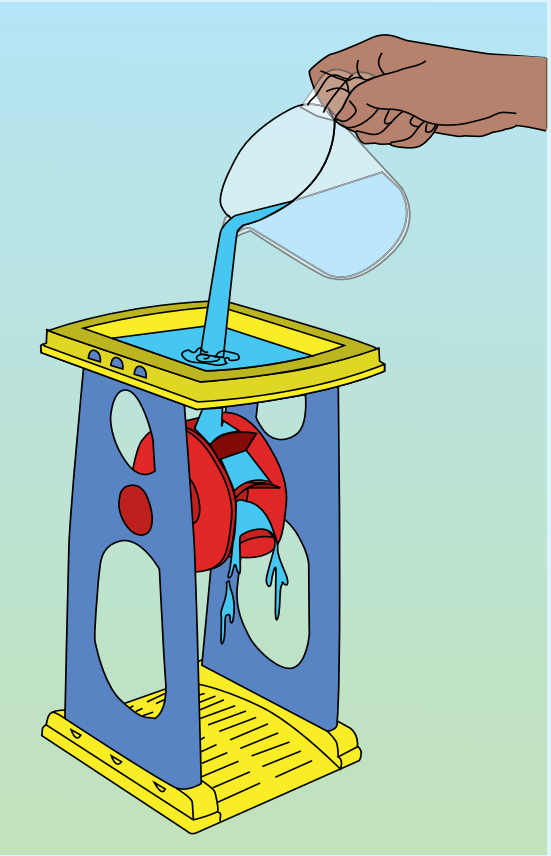
Aim
Children will use water tools to move water.

Materials
water tools
water smocks
water table
towels or mop for clean-up

Books
What Is a Scientist? by Barbara Lehn
Puddles by Jonathan London

Vocabulary
faster
first
next
slower

Approach
- In advance, experiment with water flowing through the water tools so that you can effectively guide the children's explorations.
- Begin by reviewing what the children have already learned about being a scientist. Ask: *What do scientists do?* Remind the children that scientists ask questions, try things out again and again, and look carefully.
- In small groups, have the children explore the water tools at the water table. As the children manipulate the tools, encourage them to try out different strategies by asking: *Can you think of another way to...? What would happen if...?*
- Draw the children's attention to differences among outcomes. Encourage the children to repeat the steps to produce the effects again. Help them describe what they did step by step: *What did you do first? What happened? Then what did you do next?*

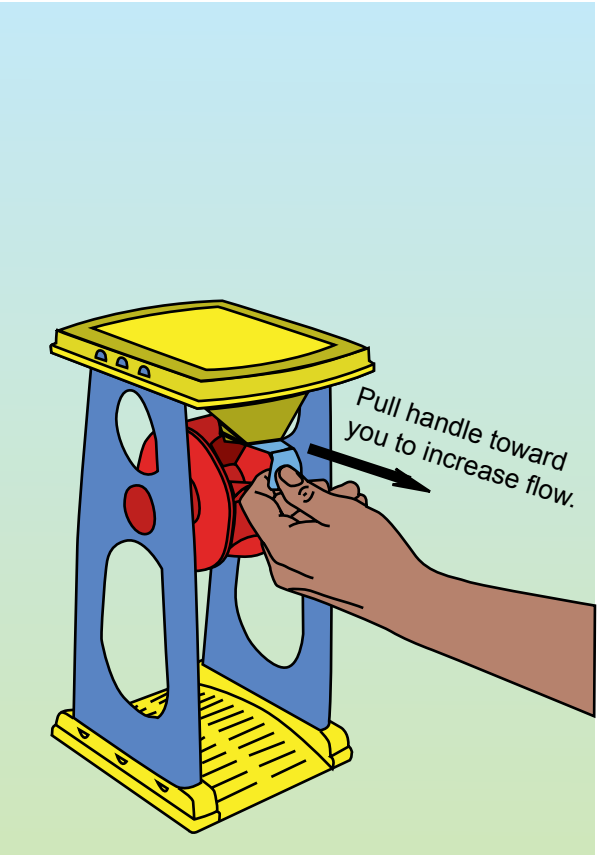


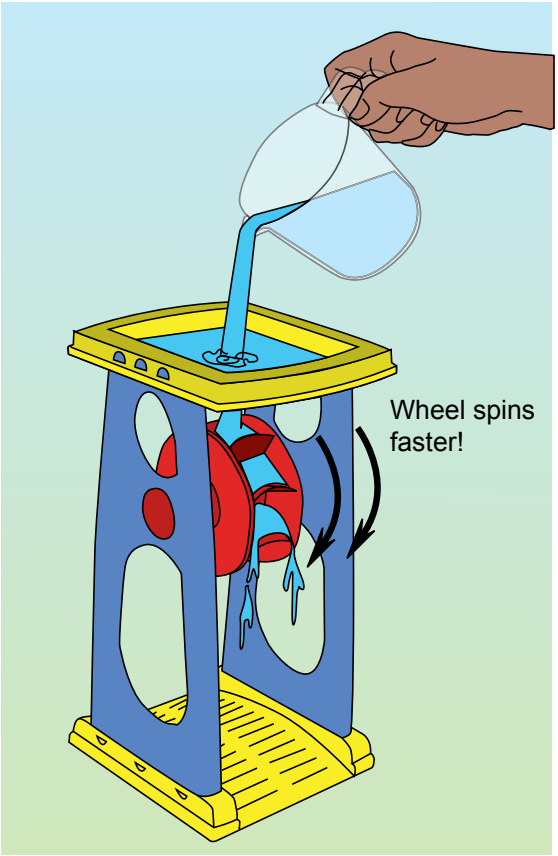
Extension

Extend the discussion by focusing on what caused the outcome (e.g., size of holes, amount of force involved).

Integrated Experiences

Literacy: Take photos of children's explorations of water tools. Add to your class science log.





Experience 10

Exploring Water Flow 2

Science Concept
Water flows.

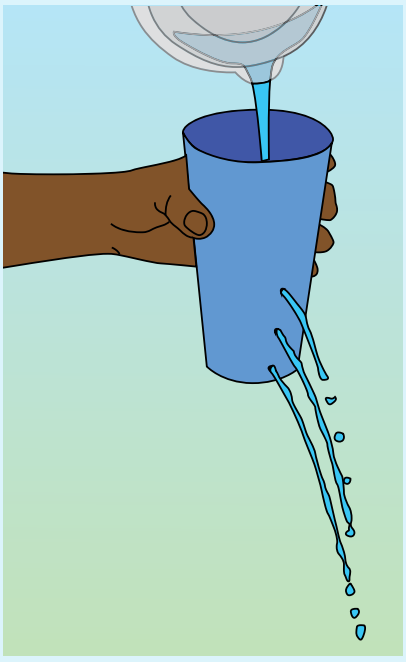
Aim
Children will investigate water flow.

Materials
water flow cups
water smocks
water table
towels or mops for clean-up

Books
Splish Splash by Joan Bransfield Graham
Water Dance by Thomas Locker

Vocabulary
farthest
fastest
flow
look
see
show
slow
stream

Approach
- In advance, experiment with water flows through the water tools so that you can effectively guide the children's explorations.
- Gather a small group of children around the water table. Show the children one of the cups with holes. Draw the children's attention to the holes and ask questions such as: *What do you think will happen if I put water in the cup? Will all the water stay in the cup? Why do you think that?*



- Distribute the cups and encourage the children to compare the streams that flow from the different holes. Ask: *Which one comes out the fastest? Which one comes out slow? Which ones goes the farthest?*
- Have the children experiment with changing the flow by plugging up holes or adjusting the amount of water in the cup: *What can you do to make the water come out of only one hole? What happens to the flow when there is a lot of water in the cup? What about when there is only a little water in the cup?*

What's happening?
How fast water flows depends on water pressure. Water will flow farther and faster if there is a greater amount of water pressing down on it.

Extension

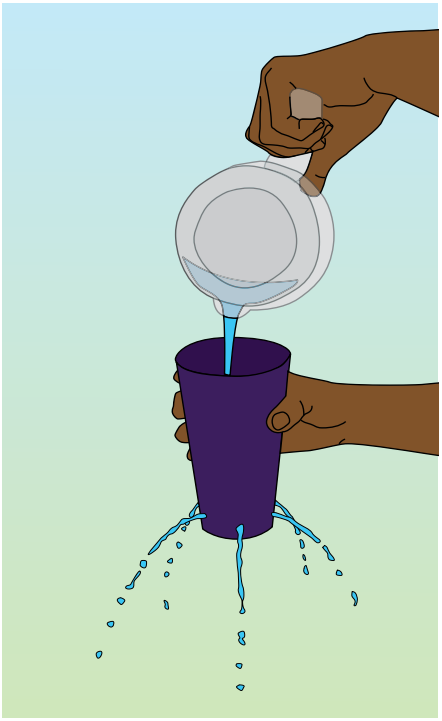
Explore streams of water further using plastic tubing and bucket sieves. Compare the size of the streams and encourage the children to try to combine small streams into large ones using their fingers.

Integrated Experiences

Literacy: Document your investigation of water flow in a class display. Add photos and children's drawings.

Math: Take the containers outdoors or cover the floor with brown butcher paper and measure how far the streams of water fall.

Creative Arts (Dramatic Play): Put firefighter hats and short lengths of rubber tubing or rope and other props in the dramatic play area to encourage pretend play around the theme of fighting fires.



Experience 11

Does Water Take Up Space?

Science Concept
Water takes up space.

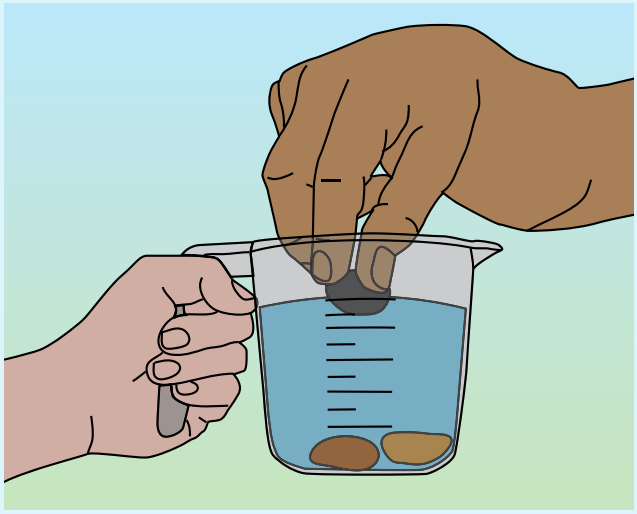
Aim
Children will be able to predict what will happen when solid objects are added to a container of water.

Materials
large measuring cup
marker or tape
rocks
towels or mops for clean-up

Books
Mr. Archimedes' Bath
by Pamela Allen
King Bidgood's in the Bathtub
by Audrey Wood

Vocabulary
after
before
down
overflow
spill
up

Approach
- In advance, do the experiment yourself. You may be surprised to see how high the starting water level needs to be in order for the water to overflow!
- Fill the measuring cup with water, leaving about two inches at the top. Mark the water level with tape or a marker.
- To begin the investigation, show the children the rocks and ask: *What do you think will happen if we put all of these rocks in the water? Do you think the water will stay here (point to the water level)? Do you think the water will go up? Do you think the water will go down? Why?*



- Distribute the rocks among the children and ask them to gently place the rocks in the cup of water one at a time.
- Focus the children's attention on the level of the water each time a new rock is placed in the cup. Continue doing this until the water overflows.

Extension

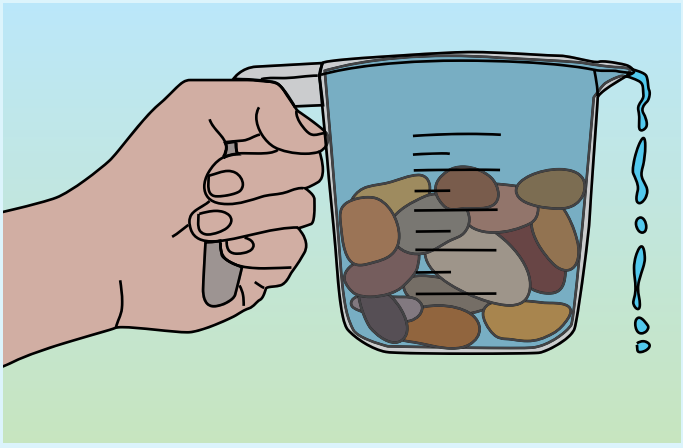
Repeat the procedure using other materials such as pennies or marbles, or even materials that float.

Integrated Experiences

Literacy: Help the children record their observations in their journals using illustrations and words, or create a class log on a large sheet of paper.

Math: During the experiment, have the children count the rocks as they are added or removed from the container.

- Explain that the water overflowed because the rocks took up space where the water once was.
- Now ask: *What will happen to the level of the water if we take the rocks out of the cup?* Have the children remove the rocks one by one, focusing the children's attention on the water level. Explain that the water level goes down because the water is moving in where the rocks were before.



Experience 12

Does Water Have Weight?

Science Concept
We use tools to collect data and extend our senses.

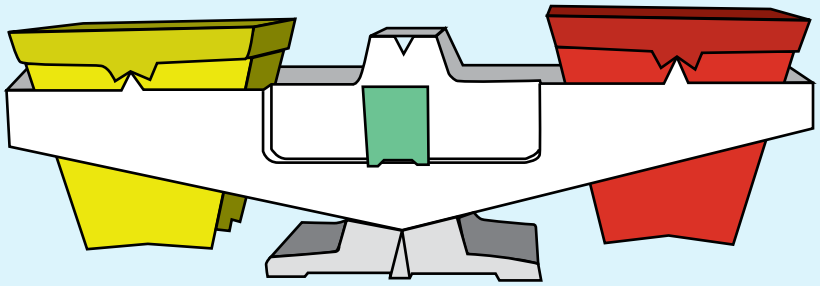
Water has weight.

Aim
Children will use a balance scale to show that water has weight.

Materials
balance scale
rocks
assortment of solid objects
container of water

Books
Just a Little Bit by Ann Tompert
How Heavy Is It? by Brian Sargent

Vocabulary
balance
heavy
light
scale
weigh



Approach
- In advance, adjust the knob at the center of the scale to make sure that the sides balance.
- In small groups, show the children the balance scale. Explain that it is called a balance scale and that we use it to compare the weights of things. Ask the children to describe any experiences they may have had with scales. Remind them that we use a different kind of scale to see how much we weigh.
- Show the children how the scale moves. Explain that if one side is heavier than the other, it will go down. Pass a rock among the group and encourage the children to feel how much it weighs. Ask: *If we put this rock in one of the containers, what do you think will happen?* Try it out and see what happens. Remove the rock.
- Show the children the water and ask: *What do you think will happen if I pour water in one side? Will the scale go down, will it go up, or will it stay the same?*

Science Center

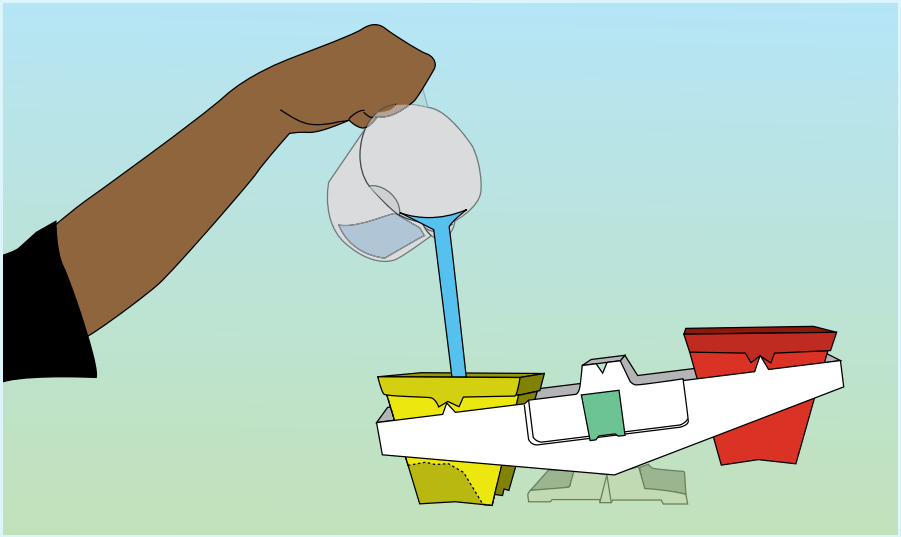
Place the scale and a variety of materials to weigh in the Center for further exploration.

Integrated Experiences

Literacy: Have the children describe how to use a balance scale using words and pictures. To simplify, provide sheets depicting the balance scale and pre-cut shapes for children to attach.

Creative Arts (Music and Movement): Sing “Jack and Jill Went Up the Hill” and let the children act out the song.

- Pour water into one of the containers and ask the children to describe what they see. Explain that the scale went down because the side with water weighs more than the side without water. Slowly add water to the other side to make the scale balance.
- Empty the containers and encourage the children to weigh combinations of water and solid objects.



Experience 13

Exploring Floating and Sinking I

Science Concept
Some objects float in water and some objects sink.

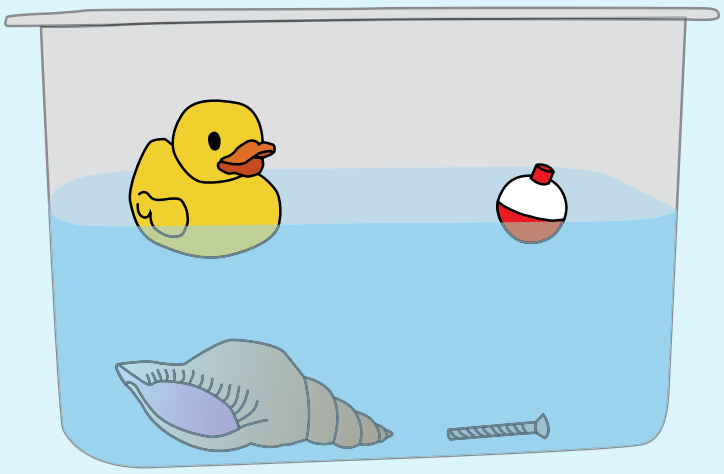
Aim
Children will investigate floating and sinking.

Materials
materials for charting results
floating and sinking collection
ship photo
clear container of water

Book
10 Little Rubber Ducks by Eric Carle
The Puddle by David McPhail
Ducky by Eve Bunting

Vocabulary
ball
block
bobber
bolt
cork
crayon
egg
float
key ring
rubber duck
shell
sink
washer

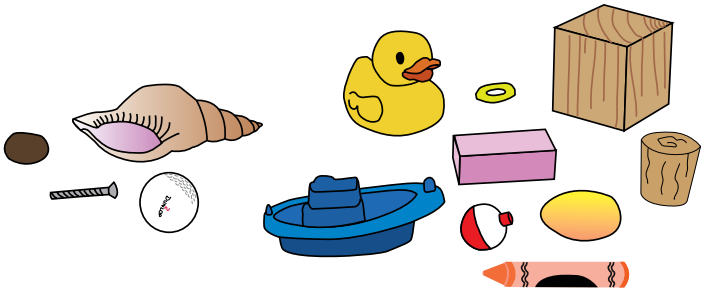
Approach
- In advance, prepare a chart to record the results of the investigation.
- Begin this experience by explaining that you are going to spend several days exploring floating and sinking. Select an object to demonstrate what it means to float. Explain that float means that something stays at the top of the water. Then demonstrate what it means to sink. Explain that things that go to the bottom sink.



- Encourage the children to share their ideas about floating and sinking. Ask: *What can you think of that sinks or goes to the bottom in the bathtub? Can you think of anything that floats or stays at the top of the water?*
- Select an object and ask: *Do you think this will float at the top of the water or sink to the bottom?* Encourage the children to explain why.
- Record on the chart whether the object sinks or floats.

Extension

Explore floating and sinking with other objects found in the classroom.



Literacy 1: Help the children record their observations in their journals using words and pictures, or create a class log on a large sheet of paper.

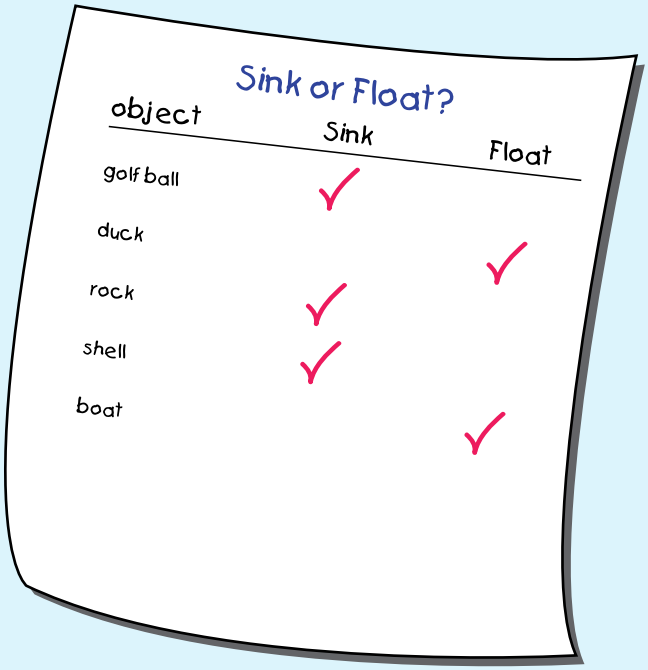
Literacy 2: Create a classroom display depicting different types of boats. Label and illustrate with photographs or the children's drawings.

Creative Arts 1 (Dramatic Play): Place cardboard boxes large enough to sit in, tubes to serve as oars, something heavy to be an anchor, and other props in the dramatic play area to encourage pretend play around a "boat" theme.

Creative Arts 2 (Art): Provide an assortment of materials (e.g., styrofoam trays, small pieces of wood) and encourage the children to make and decorate boats.

Creative Arts 3 (Music and Movement): Have the children sing "Row, Row, Row Your Boat."

- Present the remaining objects one by one and ask the children to predict whether the object will sink or float. Encourage them to explain their thinking.
- When you have finished testing all of the items, sort them into groups of things that float and those that sink.
- Talk about the features that things that sink or float have in common. Show the children the photo of the ship and explain that all heavy things do not sink. The ship is heavy, but the weight is spread out over a large space.



Experience 14

Exploring Floating and Sinking 2

Science Concept
Some objects float in water and some objects sink.

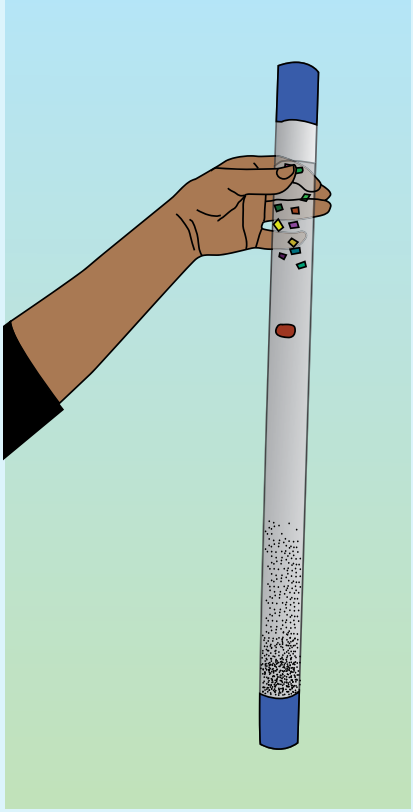
Aim
Children will further explore floating and sinking.

Materials
floating/sinking tubes
assortment of small items
water
measuring cup

Book
Who Sank the Boat? by Pamela Allen
Umbrella by Jan Brett

Vocabulary
bobbing
fast
flutter
slow

Approach
- In advance, test a variety of materials to ensure that your collection includes items that sink and float at a variety of speeds. Soak items for several days to determine whether they are suitable as some will grow mold or disintegrate. Fill one sinking tube with water and an assortment of the items.



- Review with the children what they have already learned about sinking and floating. Ask: *What does it mean to float? What does it mean to sink?*
- Show the children the floating and sinking tube. Ask the children to predict which of the items in the tube float and which sink: *Do you think this will sink or float? Why do you think that?*
- Encourage the children to watch very carefully as you turn the tube upside down. Describe what you see happening: *The straw is bobbing at the top.*
- Turn the tube upside down again. Ask: *Which things are going to the top? Which things are going to the bottom?* Encourage the children to compare how the different objects move through the water: *Which things sink the fastest? Which things sink the slowest?*
- Work with small groups of children to fill the other tubes. Encourage the children to make predictions about each item before you add it to the tube.

Extension 1

Have each child make their own floating/ sinking “tube” using plastic liter bottles.

Extension 2

Explore how the same material can both float and sink. Compare what happens when a ball of aluminum foil and a flat piece of aluminum foil are placed in water.

Integrated Experience

Literacy: Have the children draw the objects used in the experiment and label them with the words *sink* and *float*.

Math: On a chart, record which objects float, which sink, and whether they sink quickly or slowly.

Physical Health and Development (Health): Discuss water safety rules.

Experience 15

Mixing Liquids

Science Concept
Some things mix with water and other things do not.

Aim
Children will explore what happens when different liquids are mixed with water.

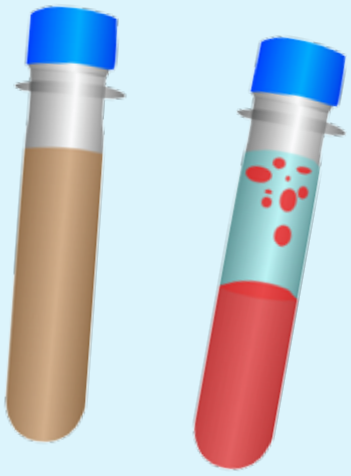
Materials
test tubes with covers
vinegar
oil
water
food coloring
measuring cup
other liquids (optional)

Book
Solids, Liquids, and Gases
by Angela Royston

Vocabulary
experiment
liquid
oil
pour
vinegar

Approach
⚠ Be sure to check for food allergies and complete any necessary paperwork.

- Add food coloring to the water.
- Begin by reviewing what the children have already learned about the way water moves. Review the idea that water takes the shape of what it is in.
- Explain that something that moves like water and takes the shape of what is holding it is called a *liquid*. Help the children identify other familiar liquids: *Can you think of other things that move like water? What about things that we drink?*
- Show the children the water, vinegar, and oil. Focus the children's attention on how they move.
- Explain that you are going to do an experiment to see what happens when you mix different liquids together.



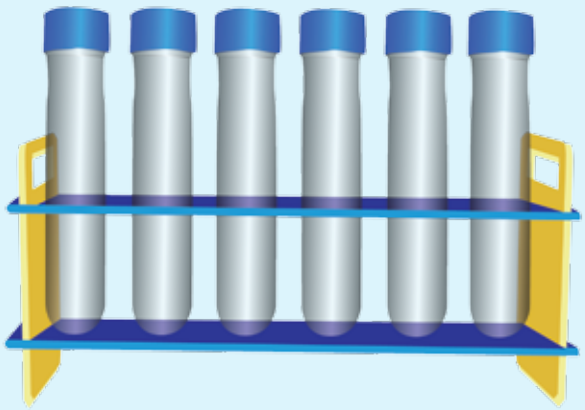
Extension

Add some liquid soap to water and oil. Observe how the soap helps the oil mix with the water for a while. Or, put a little oil on the children's hands and have them try to wash it off with just water and then with soap and water.

Science Center

Fill different test tubes with colored water and a variety of liquids. Seal tightly and have the children explore how the different liquids behave when the tubes are moved or shaken.

- Help a child fill a test tube half-full with water. Have another child add some vinegar. Cover tightly and shake. Ask the children to observe what happens. Explain that the vinegar and water are very similar liquids and so they mix together easily.
- Repeat the steps using colored water and oil. Draw the children's attention to the layer of oil that forms on top of the water. Explain that water and oil are very different liquids and so they do not mix together permanently.
- Save the filled test tubes for use in Experience 16.



Experience 16

Dissolving

Science Concept
Some things mix with water and other things do not.

Aim
Children will explore what happens when different solids are mixed with water.

Materials
test tubes with covers
plastic cups
spoons
water
sugar
cornstarch, flour, or sand
test tubes with oil and vinegar from Experience 15

Book
Solids, Liquids, and Gases by Angela Royston

Vocabulary
disappear
dissolve
invisible
sugar
taste

Approach
⚠ Be sure to check for food allergies and complete any necessary paperwork.

- Using the test tubes from Experience 15, review what the children have already learned about mixing liquids.
- Show the children the sugar. Explain that they are going to explore what happens to the sugar when it is mixed with water.
- Distribute cups to the children. Have the children pour water into their cups. Ask: *What will happen if you mix sugar in the water? Will it sink to the bottom? Will it float on the top? Will it get mixed in?* Encourage the children to explain their thinking.
- Have the children stir the sugar into the water with spoons. Ask: *What is happening? Is the sugar still in the water? Did it disappear? How can we find out?*
- Allow the children to take small tastes of the sugar solution. Introduce the term *dissolve* and explain that mixing sugar and water makes sugar water. Talk about how we know the sugar is still in the water because we can taste it. Explain that even though we cannot see the sugar, it is still there.

Extension 1

Further explore dissolving using materials such as sand, coffee grounds, and salt. See if you can separate the solids from the liquids by pouring the mixture through coffee filters.

Science Center

Fill the test tubes with water and a variety of substances that dissolve and do not dissolve such as instant coffee, liquid soap, cornstarch, or glitter. Place in the Center for further exploration.

Extension 2

Mix a small amount of water with a large amount of salt in a shallow container. Let the water evaporate over several days. Examine the salt crystals left behind.

Investigating Water

Welcome to the Investigating Water *MESS*® Take-Home Kit. This page suggests ways to further explore what your child has been learning at school.

In this Kit you will find:

- *The Water Hole* by Graeme Base

In this counting book, one, then two, and eventually ten animals come to drink at the shrinking water hole.

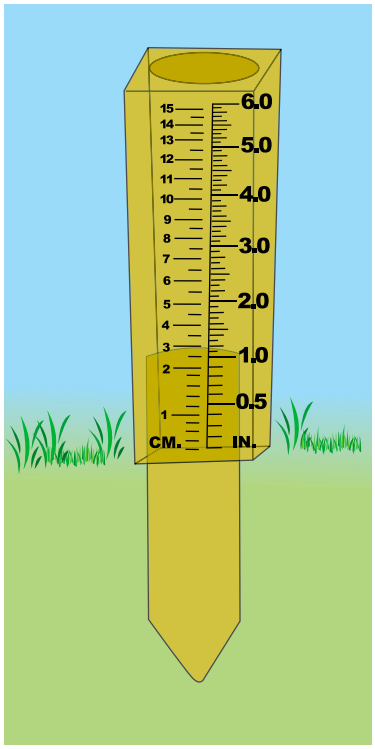
- a rain gauge

This month your child is learning:

- that all living things need water
- about measuring tools

How to use this book:

- Point to the animals as you help your child count them.
- Ask: *What is happening to the water hole? What do you think will happen to the water hole when it rains?* Explain that when it rains the water hole will fill up again.
- Read the book again and look carefully at the illustrations. Count the frogs in each picture. Try to find other animals hiding in the background.



How to use the object:

- Look at the rain gauge with your child. Point to the lines and numbers and explain how we use them to measure rainfall.
- Put the rain gauge outside and see if it collects any rain, use it to collect water from a sprinkler, or try it out in the shower or sink.

To further support your child's learning:

- Talk about the weather. Keep track of how often it rains.
- Visit a lake, river, or other body of water and talk about how important water is to all living things.

Recommended Books

Allen, Pamela. *Mr. Archimedes' Bath*. New York: HarperCollins, 1980. As Mr. Archimedes and his Australian animal friends try to figure out why the bathtub keeps overflowing, they unknowingly discover the scientific principle of water displacement.

Allen, Pamela. *Who Sank the Boat?* New York: Putman & Grosset, 1996. A cow, donkey, sheep, pig, and mouse decide to go rowing in a small boat. When one of them gets in, the boat goes from floating to sinking. Colorful illustrations add to the comic tension.

Base, Graeme. *The Water Hole*. New York: Harry N. Abrams, 2001. Arranged around the activities at an animal watering hole, this counting/puzzle/storybook demonstrates animal diversity, dependence on water holes, and the cycle of seasons. The animal sounds lighten the serious message.

Brett, Jan. *The Umbrella.* New York: Scholastic, 2004. With umbrella in hand, Carlos ventures into the cloud forest to look for native animals. From the drip, drip of water drops to the sinking of the umbrella (by a hummingbird, no less), he manages to miss all the exciting animal adventures.

Bridges, Margaret Park. *I Love the Rain*. San Francisco: Chronicle Books, 2005. From hating the rain to loving it, Molly's friend Sophie helps her see the wonder in rain. The splashy, detailed watercolor illustrations help set the mood for stimulating imaginations.

Brimner, Larry Dane. *Raindrops*. New York: Children's Press, 1999. From one raindrop to a lazy lake for sailing, the concepts that water flows and clings to itself are detailed in bright, bold pictures.

Bunting, Eve. *Ducky*. New York: Houghton Mifflin, 1997. Along with thousands of other floating toys, a rubber duck falls off a cargo ship in the middle of the ocean. The lonely duck encounters both scary sea creatures and all kinds of weather before the ocean currents deliver him to land. There he is added to the "ducks found" list before happily becoming the bath toy he was intended to be.

Carle, Eric. *10 Little Rubber Ducks/10 patitos de goma.* New York: HarperCollins, 2005. Based on the same true story as Eve Bunting's *Ducky*, the adventures of 10 rubber ducks make counting fun and useful from the factory to a storm at sea. Ordinal numerals and colorful cutout collages help the reader keep track of the ducks. Interactive sound adds a fun finishing touch.

Investigating Water

Cobb, Vicki. *I Get Wet*. New York: HarperCollins, 2002. Throughout a book designed to encourage all children to make discoveries, a young boy asks questions and suggests easily performed experiments to demonstrate several properties or water. Supplies needed for the experiments are minimal.

Frost, Helen. *Water as a Liquid*. Minneapolis, MN: Capstone Press, 2000. Using photos and age-appropriate text, this book discusses where water comes from, why it is important, and some of its liquid properties (shape and flow). The small book format limits its use. Also available by the same author: *Water as a Gas; Water as a Solid.*

Graham, Joan Bransfield. *Splish Splash*. Boston: Houghton Mifflin, 2004. Short poems within brightly colored graphic designs describe water in its many forms–from crocodile tears to sprinklers and more.

Greenfield, Eloise. *Water, Water*. New York: HarperFestival, 1999. In very simple text and colorful pictures, a young boy describes where he sees water, how it looks and feels, and what it is used for.

Keats, Ezra Jack. *The Snowy Day*. New York: Viking Press, 1962. The wonder of a snowy day is effectively conveyed in text and pictures as young Peter explores making footprints, snowballs (that melt when taken indoors!), snowmen, snow angels, and another day of wonder. Caldecott Award book.

Kerley, Barbara. *A Cool Drink of Water*. Washington, DC: National Geographic Society, 2002. “Everyone, everywhere needs water for life.” Minimal text and beautiful National Geographic photographs detail where people all over the world find their water.

Lehn, Barbara. *What Is a Scientist?* Brookfield, CT: Millbrook Press, 1998. Simple text and color photographs describe how scientists work: questioning, observing, reporting, etc. Children demonstrate each of the tasks.

Locker, Thomas. *Water Dance*. New York: Harcourt Brace, 1997. Taken together, Locker’s poems and oil illustrations represent the water cycle. Separately, the short pieces show water moving and changing. The number of details in each illustration can be a conversation starter.

London, Jonathan. *Puddles*. New York: Penguin Books, 1997. A young boy and girl experience both the sometimes frightening thunderstorm and joyful explorations of the resulting puddles, baby rivers, mud, and squirming worms. A warm bath and hot chocolate add to the day.

Investigating Water

Lunis, Natalie, and Nancy White. *Being a Scientist.* New York: Newbridge Educational Publishing, 1999. Being a scientist means observing, measuring, classifying, predicting, testing, and sharing information. Photos give children ideas of what they, as scientists, might do.

Marzollo, Jean. *I Am Water*/*Soy el agua*. New York: Scholastic, 1996. "I am . . . home for the fish, rain for the earth, etc." Simple text and colorful paper-collage illustrations detail many uses for water. Written as an early reader, the book provides opportunities for discussions about water.

McPhail, David. *The Puddle*. New York: Farrar Straus Giroux, 1998. A little boy who wants to sail his boat in a rainy day puddle meets some unexpected visitors–a talking frog, thirsty elephant, etc. The puddle eventually dries up, making the bathtub the best place for floating his sailboat.

Robinson, Fay. *Where Do Puddles Go?* Chicago: Children's Press, 1995. Colorful photos of disappearing rain puddles introduce children to the water cycle. This small-format book should be read selectively as it covers more information than young children need. A picture glossary and index are appended.

Royston, Angela. *Solids, Liquids, and Gases*. Chicago: Heinemann Library, 2002. Water's three states are described using age-appropriate text. Mixing solids and liquids, as well as melting and freezing, appropriate photos, a glossary, bibliography, and index are pluses.

Sargent, Brian. *How Heavy Is It?* New York: Children's Press, 2005. "Weight is how heavy something is." The weight of familiar heavy and light items is demonstrated on several different kinds of scales, including balances. Some advanced detail can be edited out in reading.

Schuh, Mari C. *Drinking Water*. Mankato, MN: Pebble Books, 2006. Why is water important to human bodies? Limited text and diverse, colorful photographs answer why, when, and where questions.

Shulevitz, Uri. *Snow.* New York: Farrar Straus Giroux, 1998. As snowflakes slowly come down and melt, most people in the city downplay the snowfall potential. Watercolor illustrations add detail to the sparse text about the boy who believes and even celebrates a white city.

Investigating Water

Tompert, Ann. *Just a Little Bit*. Boston: Houghton Mifflin, 1993. An elephant and a mouse want to try out the seesaw, but the weight imbalance does not allow much action. They get help from numerous other animals, but it isn't until a little brown beetle is added to the mouse's end that the balance changes.

Trumbauer, Lisa. *Why We Measure*. Mankato, MN: Yellow Umbrella Books, 2003. Rulers, maps, speedometers, scales, measuring tapes, etc. are all tools we use to measure various things. Although the small-book format is limiting, this book provides a good introduction to the concept of measurement.

Volkmann, Roy. *Curious Kittens*. New York: Random House Children's Books, 2001. In simple color photos and sparse text, two little kittens wonder about the swimming experience in a fishbowl. They explore several ways to solve the problem of getting wet, effectively demonstrating the scientific process.

Weninger, Brigitte, and Anne Möller. *Precious Water.* New York: North-South Books, 2000. A clear glass of water is the introduction to "all things need water." Plants, "animals, and people" are all examples. Collage pictures and limited text are sufficiently detailed for good discussion.

Wood, Audrey. *King Bidgood's in the Bathtub*. New York: Harcourt Brace, 1985. A number of the king's subjects fail to persuade King Bidgood to leave his bathtub–until his page does the obvious thing. Good observers, however, will note what happens to the water level in the tub as each attempt is made. Repetitive text and period illustrations add to the mood. Caldecott Honor book.

Other Recommended Books

Bryant-Mole, Karen. *Floating and Sinking.* Des Plaines, IL: Heinemann Interactive Library, 1998. This book is filled with definitions, demonstrations, and questions about floating and sinking, enough to make this a teacher reference. A bibliography, glossary, and index are appended.

Bullock, Linda. *You Can Use a Balance.* New York: Scholastic, 2004. Simple text and photographs illustrate the use of a balance for comparing weights.

Edom, Helen. *Science with Water*. London: Usborne Publishing, 1992. Packed with information, this teacher reference should provide some background for those wanting more. A note for parent and teachers provides additional information.

Investigating Water

Fowler, Allan. *It Could Still Be Water*. Chicago: Children's Press, 1992. Water's uses, sources, and liquid/solid/gas states are detailed. Glossary and index are appended to this small book.

Frost, Helen. *Water as a Gas.* Minneapolis, MN: Capstone Press, 2000. Because it is invisible, water vapor is a difficult concept for young children to grasp. This book uses photos of familiar items and limited text to make evaporation, steam, and condensation as simple as possible. Also available by the same author: *Water as a Liquid; Water as a Solid.*

Frost, Helen. *The Water Cycle*. Minneapolis, MN: Capstone Press, 2000. Evaporation, condensation, and precipitation are discussed in the context of the water cycle. Text is limited and photos are full-page in a small-book format.

Frost, Helen. *We Need Water*. Minneapolis, MN: Capstone Press, 2000. Not only do animals and plants need water to live, people need water for growing food, cooking, cleaning, etc. While format is small, photos are whole page and text is very limited. A glossary, bibliography (including internet sources), and index are appended.

Glaser, Omri. *Round the Garden*. New York: Harry N. Abrams, 1999. The water cycle is quietly demonstrated from a teardrop to a rain cloud that falls on the garden where more onions are growing! Words are very limited, colors are bold, and illustrations are simple but sufficiently detailed to hold interest.

Martin Jr., Bill & Archambault, John. *Listen to the Rain*. New York: Henry Holt, 1998. Soft, wispy illustrations and lyrical descriptions of the sounds of rain and moving water make a great listening experience for two or more. Where does the water go when the drips stop?

McDonnell, Flora. *Splash*. Cambridge, MA: Candlewick Press, 1999. A baby elephant playfully leads the other animals to appreciate that water is not only for drinking, it also has cooling properties.

Reidel, Marlene. *From Ice to Rain*. Minneapolis, MN: Carolrhoda Books, 1981. Ice from water, warming and cooling, floating things, evaporation, water vapor, and rain are all packed into a small book with straight-forward text and simple color illustrations.

Royston, Angela. *Water*. Chicago: Heinemann Library, 2002. Colorful photographs illustrate a variety of water topics. The range of topics and amount of text make this book useful as a teacher reference. However, read selectively, portions can support many water experiences.

Investigating Water

Schaefer, Lola M. *This Is the Rain*. New York: Greenwillow Books, 2001. A cumulative, rhyming story of the water cycle, the value of water to living things, and the evaporation process. Colorful, mixed-media collages can be perplexing, but provide observation practice.

Sis, Peter. *Ship Ahoy!* New York: HarperCollins, 1999. A young boy's imagination runs–wordlessly–to ships in his living room. There's a raft and a canoe, a submarine and an ocean liner, and finally a mysterious ocean creature from mother's vacuum hose. Simple illustrations serve as conversation starters.

Speed, Toby. *Water Voices*. New York: G.P. Putnam's Sons, 1998. Seven short poems vividly describe watery experiences and each ends with "who am I?" Not all situations will be familiar to young children, but some will. Illustrations are gentle watercolors with enough detail for practicing observation skills.

Spier, Peter. *Rain*. New York: Delacorte Press, 1982. Wordlessly, two children and their dog go out to explore their rainy world. They experience water flowing and collecting in puddles, rain drops, things floating, plants and animals thriving, and the warmth of home. Individual detailed illustrations provide great observation practice and discussion stimulants.

Wick, Walter. *A Drop of Water*. New York: Scholastic, 1997. Although the text and many of the concepts are too complex for young children, the photographs can be used to support early conversations about water drops, ice, steam, condensation, and evaporation.

Yolen, Jane. *Water Music.* Honesdale, PA: Boyds Mills Press, 1995. Beautiful photographs of water inspire poems that sometimes reflect ideas that are too advanced for young children. Photos, especially those of water drops and icicles, are useful without the poems.

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
Language Development	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Demonstrates increasing ability to attend to and understand conversations, stories, songs, poems.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Shows progress in understanding and following simple and multi-step directions.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Understands an increasingly complex and varied vocabulary.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
For Non-English speaking children, progresses in listening to and understanding English.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops increasing abilities to understand and use language to communicate information, experiences, ideas, feelings, opinions, needs, questions, and for other varied purposes.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Progresses in abilities to imitate and respond appropriately in conversation and discussions with peers and adults.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Uses an increasingly complex and varied spoken vocabulary.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Progresses in clarity of pronunciation and towards speaking in sentences of increasing length and grammatical complexity.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
For Non-English speaking children, progresses in speaking English.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
LITERACY																	
Shows increasing ability to discriminate and identify sounds in spoken language.																	
Shows growing awareness of the beginning and ending sounds of words.																	
Progresses in recognizing matching sounds and rhymes in familiar words, games, songs, stories and poems.																	
Shows growing ability to hear and discriminate separate syllables in words.																	

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
LITERACY CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Associates sounds with written words, such as awareness that different words begin with the same sound.																	
Shows growing interest and involvement in listening to and discussing a variety of fiction and nonfiction books and poetry.																	•
Shows a growing interest in reading-related activities, such as asking to have a favorite book read; choosing to look at books; drawing pictures based on stories; asking to take books home; going to the library; and engaging in pretend-reading with other children.																	•
Demonstrates progress in abilities to retell and dictate stories, to act out stories, and to predict what will happen next in a story.																	•
Progresses in learning how to handle and care for books; knowing to view one page at a time in sequence from front to back; and understanding that a book has a title, author and illustrator.																	•
Shows increasing awareness of print in classroom, home and community settings.	•								•								•
Develops growing understanding of the different functions of forms or print such as signs, letters, newspapers, lists, messages, and menus.	•								•								•
Demonstrates increasing awareness of concepts of print, such as that reading in English moves from top to bottom and from left to right, that speech can be written down, and that print conveys a message.	•								•								•
Shows progress in recognizing the association between spoken and written words by following print as it is read aloud.	•								•								•
Recognizes a word as a unit of print, or awareness that letters are grouped to form words, and that words are separated by spaces.	•								•								•
Develops understanding that writing is a way of communicating for a variety of purposes.	•								•								

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
LITERACY CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Begins to represent stories and experiences through pictures, dictation, and in play.																	
Experiments with a growing variety of writing tools and materials, such as pencils, crayons, and computers.																	
Progresses from using scribbles, shapes, or pictures to represent ideas, to using letter-like symbols, to copying or writing familiar words such as their own name.																	
Shows progress in associating the names of letters with their shapes and sounds.																	
Increases in ability to notice the beginning letters in familiar words.																	
Identifies at least 10 letters of the alphabet, especially those in their own name.																	
Knows the letters of the alphabet are a special category of visual graphics than can be individually named.																	
MATHEMATICS																	
Demonstrates increasing interest and awareness of numbers and counting as a means of solving problems and determining quantity.				•	•						•						
Begins to associate number concepts, vocabulary, quantities, and written numerals in meaningful ways.				•	•	•					•	•		•			•
Develops increasing ability to count in sequence to 10 and beyond.				•							•						•
Begins to make use of one-to-one correspondence in counting objects and in matching groups of objects.				•	•						•			•			•
Begins to use language to compare numbers of objects with terms such as more, less, greater than, fewer, equal to.				•	•	•					•			•			•
Develops increased abilities to combine, separate and name “how many” concrete objects.																	

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
MATHEMATICS CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Begins to recognize, describe, compare, and name common shapes, their parts and attributes.			•	•													
Progresses in ability to put together and take apart shapes.																	
Begins to be able to determine whether or not two shapes are the same size and shape.				•													
Shows growth in matching, sorting according to 1 or 2 attributes such as color, shape or size.			•														
Builds an increasing understanding of directionality, order and positions of objects, and words such as up, down, over, under, top, bottom, inside, outside, in front, and behind.	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
Enhances abilities to recognize, duplicate and extend simple patterns using a variety of materials.				•					•	•							
Shows increasing abilities to match, sort, put in a series, and regroup objects according to one or two attributes such as shape or size.			•										•				
Begins to make comparisons between several objects based on a single attribute.			•										•				
Shows progress in using standard and non-standard measures for length and area of objects.																	
SCIENCE																	
Begins to use senses and a variety of tools and simple measuring devices to gather information, investigate materials, and observe processes and relationships.	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops increased ability to observe and discuss common properties, differences and comparisons among objects and materials.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Begins to participate in simple investigations to test observations, discuss and draw conclusions and form generalizations.	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops growing abilities to collect, describe and record information through a variety of means, including discussion, drawings, maps and charts	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
SCIENCE CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Begins to describe and discuss predictions, explanations, and generalizations based on past experiences.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Expands knowledge of and abilities to observe, describe and discuss the natural world, materials, living things, and natural processes.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Expands knowledge of and respect for their body and the environment.	•	•															•
Develops growing awareness of ideas and language related to attributes of time and temperature.							•	•									•
Shows increased awareness and beginning understanding of changes in materials and cause-effect relationships.						•	•	•	•	•	•	•			•	•	
CREATIVE ARTS																	
Participates with increasing interest and enjoyment in a variety of music activities, including listening, singing, finger plays, games, and performances.																	
Experiments with a variety of musical instruments.																	
Gains ability in using different art media and materials in a variety of ways for creative expression and representation.																	
Progresses in abilities to create drawings, paintings, models, and other art creations that are more detailed, creative or realistic.																	
Develops growing abilities to plan, work independently, and demonstrate care and persistence in a variety of art projects.																	
Begins to understand and share opinions about artistic products and experiences.																	
Expresses through movement and dancing what is felt and heard in various musical tempos and styles.																	
Shows growth in moving in time to different patterns of beat and rhythm in music.																	

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
CREATIVE ARTS CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Participates in a variety of dramatic play activities that become more extended and complex.																	
Shows growing creativity and imagination in using materials and in assuming different roles in dramatic play situations.																	
SOCIAL & EMOTIONAL DEVELOPMENT																	
Begins to develop and express awareness of self in terms of specific abilities, characteristics and preferences.	•	•	•						•	•		•			•	•	
Develops growing capacity for independence in a range of activities, routines, and tasks.		•	•						•	•		•			•	•	
Demonstrates growing confidence in a range of abilities and expresses pride in accomplishments.		•	•	•					•	•		•			•	•	
Shows progress in expressing feelings, needs and opinions in difficult situations and conflicts without harming themselves, others, or property.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Develops growing understanding of how their actions affects others and begins to accept the consequences of their actions.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Demonstrates increasing capacity to follow rules and routines and use materials purposefully, safely, and respectfully.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Increases abilities to sustain interactions with peers by helping, sharing, and discussion.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Shows increasing abilities to use compromise and discussion in working, playing, and resolving conflicts with peers.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Develops increasing abilities to give and take in interactions; to take turns, and to interact without being overly submissive or directive.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Demonstrates increasing comfort in talking with and accepting guidance and directions from a range of familiar adults.				•					•	•							
Shows progress in developing friendships with peers.																	

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
SOCIAL & EMOTIONAL CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Progresses in responding sympathetically to peers who are in need, upset, hurt, or angry; and in expressing empathy or caring for others.																	
Develops ability to identify personal characteristics including gender, and family composition.																	
Progress in understanding similarities and respecting differences among people, such as genders, race, special needs, culture, language, and family structures.																	
Develops growing awareness of jobs and what is required to perform them.																	
Begins to express and understand concepts and language of geography in the contexts of their classroom, home, and community.																	
APPROACHES TO LEARNING																	
Chooses to participate in an increasing variety of tasks and activities.		•										•			•	•	•
Develops increased ability to make independent choices.	•	•	•	•					•	•		•	•		•	•	•
Approaches tasks and activities with increased flexibility, imagination, and inventiveness.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Grows in eagerness to learn about and discuss a growing range of topics, ideas and tasks.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Grows in abilities to persist in and complete a variety of tasks, activities, projects, and experiences.				•					•	•		•					
Demonstrates increasing ability to set goals and develop and follow through on plans.				•				•	•								
Shows growing capacity to maintain concentration, despite distractions and interruptions.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops increasing ability to find more than one solution to a question, task or problem.								•	•								
Grows in recognizing and solving problems through active exploration, including trial and error, and interactions and discussions with peers and adults.	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Head Start Domains and Indicators Associated with Core and Center Experiences

Domain & Indicators	Experience																
APPROACHES TO LEARNING CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	T-H
Develops increasing abilities to classify, compare, and contrast objects, events, and experiences.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
PHYSICAL HEALTH AND DEVELOPMENT																	
Develops growing strength, dexterity, and control needed to use tools such as scissors, paper punch, stapler, and hammer.				•													
Grows in hand-eye coordination in building with blocks, putting together puzzles, reproducing shapes and patterns, stringing beads and using scissors.																	
Progresses in abilities to use writing, drawing and art tools including pencils, markers, chalk, paint brushes, and various types of technology.																	
Shows increasing levels of proficiency, control and balance in walking, climbing, running, jumping, hopping, skipping, marching and galloping.																	
Demonstrates increasing abilities to coordinate movements in throwing, catching, kicking, bouncing balls, and using the slide and swing.																	
Progresses in physical growth, strength, stamina, and flexibility.																	
Participates actively in games, outdoor play and other forms of exercise that enhance physical fitness.																	
Shows growing independence in hygiene, nutrition and personal care when eating, dressing, washing hands, brushing teeth and tolieting.																	
Builds awareness and ability to follow basic health and safety rules such as fire safety, traffic and pedestrian safety, and responding appropriately to potentially harmful objects, substances and activities.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

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Series editor is Betty A. Dunckel. Primary authors are Shari Ellis and Jeanne Chamberlin. Designer and illustrator is Dale A. Johnson.

Contributing authors from the Florida Museum include Katrina Babulski, Karin M. Blyler, Janice S. Chang, Stephanie Dodman, Domenic J. Durante, Katherine V. Edison, Deborah Johnson-Simon, Mary Ellen McKay-Easters, Barbara H. Ornstein, Marina Post, Beverly B. Rogers, and Carrie B. Sheets. Advice and consultation were provided by JoAn Knight Herren, Michele A. Plutro, Muriel Richardson, and Suzanne Thouvenelle, all with the Office of Head Start.

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Florida Museum of Natural History
University of Florida
Gainesville, FL
www.flmnh.ufl.edu