Kitchen Science

Teacher's Guide

MESS
Marvelous Explorations through Science and Stories

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Kitchen Science

Table of Contents

		Page
Teacher Background Information		1
Materials List		5
Experiences		
1	Solids and Liquids	12
2	Mixing Liquids	14
3	Mixing Solids and Liquids	16
4	Introduction to Bubbles	18
5	Experimenting with Bubbles	20
6	Play Dough	22
7	Changing Play Dough	24
8	Making a Gas	26
9	Bread	28
10	Butter	30
11	Clean Mud	32
12	Color Mixing 1	34
13	Color Mixing 2	36
14	Ice Pops	38
15	Ice Cream	40
16	Popcorn	42
Take-Home Kit Information/Experience Card		44
Copy of MESS Recipe Book		45
Recommended Books		51
Head Start Domains and Indicators		58

Kitchen Science

Teacher Background Information

What is the focus of this Kit?

This Kit focuses on everyday substances and how we can change their properties by adding heat or cold, physically manipulating them, or mixing them together.

What science concepts are covered in this Kit?

- Everything in the world is a solid, liquid, gas, or a combination.
- Substances have many observable properties including size, shape, mass, and color.
- Physical actions can change the properties of substances.
- Heating and cooling can change the properties of substances.
- Substances vary in the way they react with other substances.
- Combining substances can produce a new substance with different properties.

Why is this Kit called "Kitchen Science?"

We named this Kit "Kitchen Science" because the experiences use common, everyday substances often found in the kitchen such as soap, vinegar, oil, and flour. Also, some of the experiences involve making things that can be eaten, ice cream and popcorn, for example. Others involve ingredients and actions that easily can be extended to cooking projects.

What is the science in "Kitchen Science?"

In this Kit, we encourage children to explore the properties of different substances and to experiment with ways to change those properties. The science that underlies physical and chemical changes can be quite complex. Even seemingly simple questions—*What happens when I fold paper? Where do bubbles go?*—have complicated answers involving molecules and atoms and, sometimes, **chemical reactions**.

It can be very challenging to offer explanations of change that are helpful to young children. The focus of this Kit is not, however, on explaining phenomena, but rather on engaging children in investigations of change. The experiences in this Kit offer many valuable opportunities to make careful observations, compare materials, use descriptive vocabulary, generate hypotheses, make predictions,

Kitchen Science

draw conclusions, and share results with others. The “science” in kitchen science is the process of creating change. Before you get started, here is a brief review of some basic science facts.

States of Matter

All substances are made of **matter**. Matter on Earth is in one of three states. **Solids** are forms of matter that have definite shapes. Apples and flour are solids. **Liquids** are forms of matter that can flow freely and take the shape of a container. Water and milk are liquids. The third state of matter is **gas**. The gaseous form of water is steam. Carbon dioxide is a gas that can be produced easily by combining vinegar and baking soda. The air that blows on our faces on a windy day is made up of a number of different gases.

Physical Actions as a Cause of Change

There are many ways of changing the properties of substances. Actions such as bending, folding, cutting, and tearing can change the size and shape of materials. Because these actions are so straightforward, teachers sometimes neglect them in favor of more dramatic examples of change. This is unfortunate because exploration of these kinds of physical changes offer many opportunities to introduce vocabulary, tools, skills, and the idea that some changes can be undone or reversed, while others are irreversible.

Sometimes, even simple physical actions can cause dramatic results. For example, shaking milk or cream for a while will produce butter. Why? The shaking damages the membranes of fat globules and that allows the liquid fat to flow together into a continuous mass.

The simple act of shaking is also key to making delicious ice cream. Shaking milk or cream while lowering its temperature adds air to the mixture. Without shaking, the ice cream would resemble an ice cube.

Mixing as a Cause of Change

Another way to change substances is to mix them together. Some substances mix together easily; others do not mix at all. For example, some liquids—vinegar or fruit juice, for example—readily mix with water. In contrast, when oil is

combined with water, beads of it will float around and eventually settle on the top.

Similarly, some solids mix with liquids, while others do not. For example, sugar and salt will **dissolve** in water, while sand or cornstarch will be suspended in the liquid and eventually settle on the bottom.

Sometimes, mixing substances can create a new one. For example, mixing baking soda with vinegar produces new substances, carbon dioxide and water. The changes we observe when mixing substances are due to the chemical structures of the substances and the reactions that take place between them.

Temperature Varions as a Cause of Change

Another way to change the properties of a substance is through heating and cooling. Heating a substance can speed chemical reactions and cause physical changes such as shrinking, swelling, or vaporization.

Young children already may be familiar with another effect of heat—**melting**. Melting changes a solid into a liquid. Different substances melt at different temperatures. Substances that melt very easily include wax, plastic, butter, and, of course, ice cream! Sometimes a change caused by melting can be reversed. For example, water that forms when ice is melted can be turned back into ice. Melting cheese, on the other hand, involves chemical changes that cannot be reversed.

In this Guide, we describe two experiences that involve heat—baking bread and making popcorn. Heat plays different roles in the two experiences. In the case of bread, heat is key in activating the yeast. The yeast then releases a gas that makes air pockets in the bread and causes the bread to rise. Once bread is in the oven, the higher temperature kills the yeast and the bread stops rising.

Popcorn pops because there is water inside the kernel that turns to steam when heated. Pressure from the steam builds up until the entire kernel explodes! The reason popcorn reacts to heat this way while other kinds of corn do not is that popcorn has a much thicker hull on the outside of the kernel than do other kinds of corn.

Kitchen Science

Similarly, cooling can slow chemical reactions or cause changes in the physical characteristics of substances. One exotic example is molten lava which turns to rock when cooled. An everyday example is what happens when hot water from a shower or bath reaches the cool surface of a mirror—water drops form. Perhaps the easiest way to demonstrate the effects of cooling is to explore **freezing**. Freezing is almost the exact opposite of melting. Freezing turns a liquid into a solid. As with melting, different substances freeze at different temperatures.

What can I do to best support children's investigations?

To help children gain the most from these experiences, talk with them as they examine various substances. Encourage the children to explore the substances using different senses; describe characteristics such as color, texture, and shape; and explain the ways various substances are alike and different.

When children manipulate substances such as play dough, ask them to describe what they are doing. Help them set a goal (e.g., make a "snake"), and encourage them to try to reach it. If children produce an outcome, ask them to show you how they did it.

Help children make connections across experiences. Begin each experience by reviewing what the children already know and conclude by reviewing what they have learned. Help children draw on their prior knowledge by asking them what they think will happen when they do various things to substances.

And, when cool things happen, say "that's science!"

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

- Keep potentially dangerous tools (e.g., graters) out of children's reach.
- Be sure to keep electric outlets covered with safety caps when not in use.
- Be alert to items that pose choking hazards (e.g., food, balloons).
- Have children wash their hands well and frequently.
- Disinfect tabletops, counters, and cooking equipment when preparing food.
- Do not allow children to nibble during cooking.
- Wash fruits and vegetables before they are used.

- Be alert to food allergies. A ! symbol is near experiences that involve food to remind you to check for food allergies and complete the necessary paperwork.

Teacher Vocabulary

chemical reaction – a process in which one or more substances are turned into new substances

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

freezing – to change from liquid to solid by the loss of heat

gas – a substance, usually invisible, that has no shape and spreads to fill space

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

matter – anything that takes up space and has mass

melting – to change from solid to liquid by the application of heat

solid – a material that keeps its shape

volume – the amount of space something takes up

MESS® Materials for Core and Center Experiences

Materials	Books
Experience 1: Solids and Liquids plastic test tubes with covers assortment of liquids (water, liquid soap, juice, paint) assortment of large and small solid objects (blocks, beads, shells) assortment of containers of different shapes	*Solids, Liquids, and Gases* by Angela Royston *Change It!* by Adrienne Mason *What Is a Scientist?* by Barbara Lehn
Experience 2: Mixing Liquids plastic test tubes with covers cooking oil vinegar or apple juice water colored with food coloring funnels measuring cup	*Solids, Liquids, and Gases* by Angela Royston *Change It!* by Adrienne Mason *What Is a Scientist?* by Barbara Lehn
Experience 3: Mixing Solids and Liquids plastic test tubes with covers clear plastic cups spoons container of warm water salt assortment of solid substances (cornstarch, glitter, instant coffee)	*Solids, Liquids, and Gases* by Angela Royston *Change It!* by Adrienne Mason *What Is a Scientist?* by Barbara Lehn *Duck Soup* by Jackie Urbanovic *Purple Delicious Blackberry Jam* by Lisa Westberg Peters
Experience 4: Introduction to Bubbles bubble solution container of water dish detergent water table or shallow tubs large and small round bubble wands shallow trays to hold bubble solution	*Bubbles, Bubbles Everywhere* by Dwight Kuhn & Melvin Berger *Pop! A Book About Bubbles* by Kimberly Brubaker Bradley

Materials	Books
Experience 5: Experimenting with Bubbles bubble solution variety of liquids such as soap, soda, and milk bubble wands of varying sizes and shapes shallow trays to hold bubble solution plastic test tubes with covers	*Pop! a Book About Bubbles* by Kimberly Brubaker Bradley *Bubbles, Bubbles Everywhere* by Dwight Kuhn & Melvin Berger
Experience 6: Play Dough mixing bowl mixing spoon measuring cup 4 cups flour 1 cup salt 1 ½ cup warm water vegetable oil (optional) food coloring (optional)	*Tallulah in the Kitchen* by Nancy Wolff *What Is a Scientist?* by Barbara Lehn *Why we Measure* by Lisa Trumbauer *Pancakes for Breakfast* by Tomie de Paola
Experience 7: Changing Play Dough play dough or clay a variety of clay tools such as cutters, rollers, and stampers	*Change It!* by Adrienne Mason
Experience 8: Making a Gas baking soda vinegar clear containers food coloring (optional) measuring cups teaspoon	*Change It!* by Adrienne Mason *Gases* by Robin Nelson

Materials

Experience 9: Bread

2 cups all-purpose flour
1 cup wheat flour
1 package rapid-rise yeast
3 tablespoons sugar
1 cup warm water
3 tablespoons nonfat dry milk
1 teaspoon salt
3 tablespoons vegetable oil
measuring cup
measuring spoons
3 tablespoons vegetable oil
8 ½" x 4 ½" x 2 ¼" loaf pan
dish towel
heavy-duty gallon sealable bag
oven

Experience 10: Butter

measuring cup
¼ cup heavy cream per child
salt
small container with lid per child
spoons or knives (optional)
bread or crackers (optional)
timer (optional)
marble (optional)

Experience 11: Clean Mud

measuring cup
mixing spoon
grater
½ roll toilet paper
bar of Dove or Ivory soap, grated
warm water
assortment of tools and containers

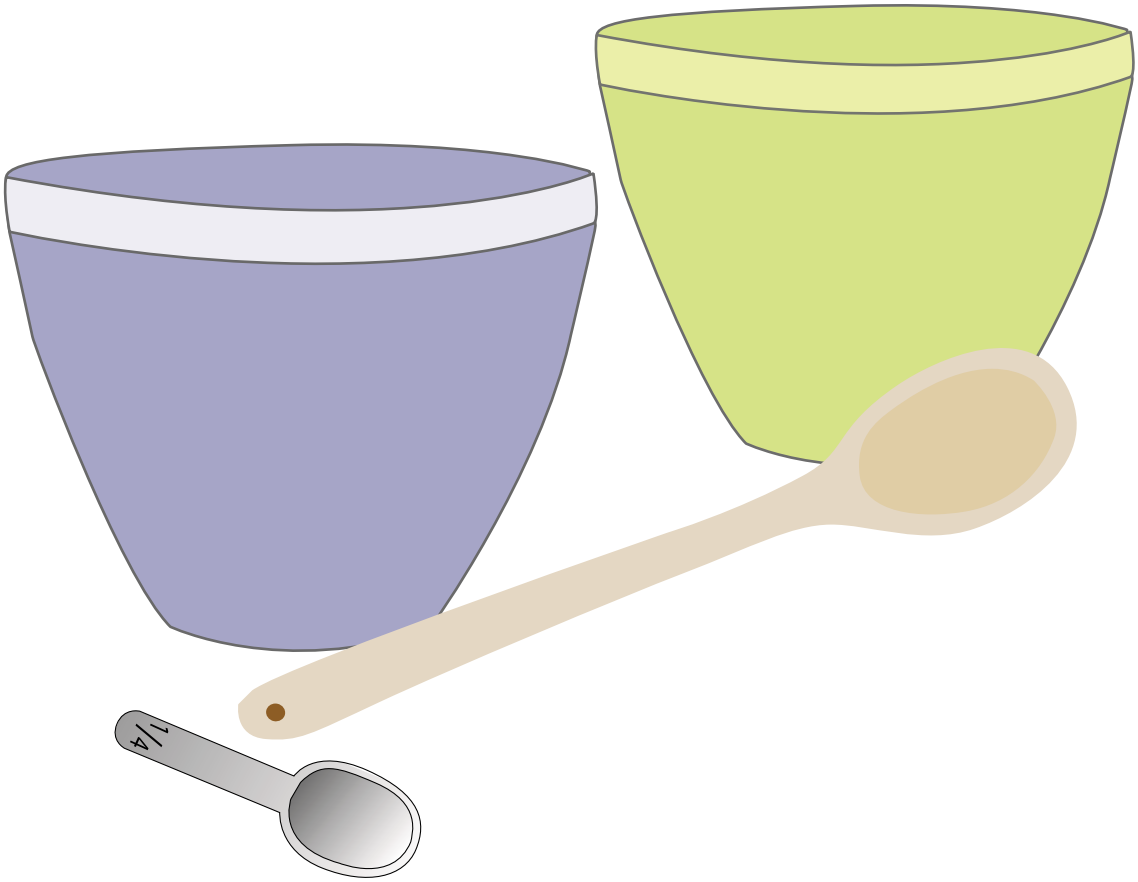
Books

Duck Soup by Jackie Urbanovic
Bread Comes to Life by George Levenson
The Little Red Hen (Makes a Pizza) by Philomen Sturges
Walter the Baker by Eric Carle
The Pizza that We Made by Joan Holub
Blue Bowl Down by C. M. Millen

Why We Measure by Lisa Trumbauer
Solids, Liquids, and Gases by Angela Royston
Let's Make Butter by Eleanor Smith & Lyzz Roth-Singer
Pancakes, Pancakes! by Eric Carle
Pancakes for Breakfast by Tomie de Paola
Bunny Cakes by Rosemary Wells

Materials	Books
Experience 12: Color Mixing 1	
red, yellow, and blue paints paint brushes paper food coloring water color equation cards plastc test tubes with covers color glasses	*Mouse Paint* by Ellen Stoll Walsh *Little Blue and Little Yellow* by Leo Lionni *Warthogs Paint* by Pamela
Experience 13: Color Mixing 2	
color equation cards red, yellow, and blue food coloring water ice cube trays or small cups freezer small plastic cups or bowls warm water plastic test tubes with covers color glasses	Duncan Edwards *Mouse Paint* by Ellen Stoll Walsh *Little Blue and Little Yellow* by Leo Lionni *Warthogs Paint* by Pamela
Experience 14: Ice Pops	
ice pop molds fruit juice small cups freezer ice cubes	Duncan Edwards *Change It!* by Adrienne Mason *Solids, Liquids, and Gases* by

Materials	Books
Experience 15: Ice Cream per serving 1 cup half & half or whole milk 2 tablespoons sugar ½ teaspoon vanilla extract ½ cup rock salt ½ cup water ice to fill gallon bag half-way 1 quart-size sealable freezer bags 2 gallon-size sealable freezer bags 1 small bowl or cup 1 spoon	Angela Royston *From Cow to Ice Cream* by Bertram Knight *From Milk to Ice Cream* by Ali Mitgutsch *Why We Measure* by Lisa Trumbauer
Experience 16: Popcorn hot air popcorn popper popcorn salt cups or bowls for serving	*Popcorn* by Alex Moran *The Popcorn Book* by Tomie de Paola *Purple Delicious Blackberry Jam* by Lisa Westberg Peters *Duck Soup* by Jackie Urbanovic *Warthogs in the Kitchen* by Pamela Duncan Edwards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Experience 1

Solids and Liquids

Science Concepts

Everything in the world is either a solid, liquid, gas, or a combination.

Substances have many observable properties including size, shape, mass, and color.

Aim

Children will explore the differences between solids and liquids.

Materials

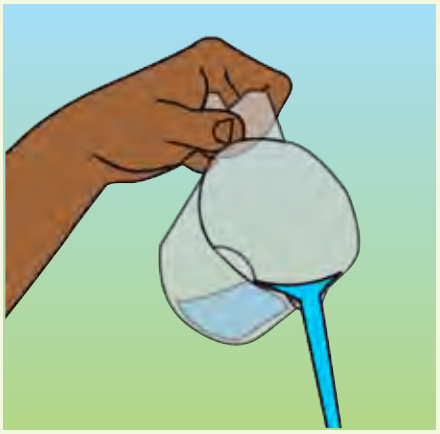
plastic test tubes with covers
assortment of liquids (water, liquid soap, juice, paint)
assortment of large and small solid objects (blocks, beads, shells)
assortment of containers of different shapes

Books

Solids, Liquids, and Gases by Angela Royston
Change It! by Adrienne Mason
What Is a Scientist? by Barbara Lehn

Vocabulary

change
flow
liquid
pour
roll
slide
solid



Approach

⚠ In advance, check for food allergies and complete necessary paperwork. Also, experiment with the materials so that you can clearly demonstrate the differences between solids and liquids. Review the books and mark the pages relevant to this experience.

Show the children a variety of solid objects. Ask the children to describe each object: *What color is it? Is it hard or soft? Is it rough or smooth?* Introduce the term "solid." Explain that even though the objects differ in many ways, they all are solids.

Then show the children the different liquids. Help the children identify the liquids. Introduce the term "liquid." Show how the different liquids move inside their containers. Pour one of the liquids into a shallow container. Explain that a liquid takes the shape of what is holding it. Place solid objects in different containers. Talk about how solid objects do not change their shape.

Science Center

Pour different liquids in several plastic test tubes with covers and place solid objects in others. Place in the Center and encourage the children to manipulate the tubes and compare how the liquids and solids move.

Integrated Experiences

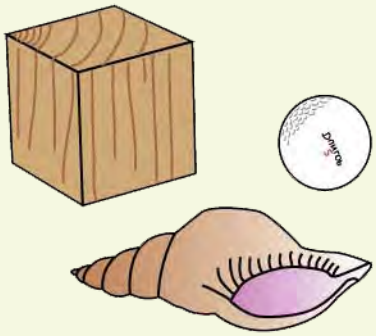
Literacy 1: Have the children describe and illustrate their favorite liquid.

Literacy 2: Create a class display showing different solids and liquids using photographs, illustrations, or the children's drawings.

Math: Compare how slowly a thick liquid such as syrup pours compared to a thin liquid such as water.

Creative Arts (Art): Have the children make a mixed-media picture using solids and liquids (e.g., use glue to attach small objects to paper; paint a picture and add objects).

- Encourage the children to move the liquids and solids around in the containers. Ask: *What is happening? What shape is it? Will moving it change its shape? What shape is it now?*
- Review the concepts of solid and liquid by having the children find other examples of each in the classroom.



Experience 2

Mixing Liquids

Science Concept
Substances vary in the way they react with other substances.

Aim
Children will explore mixing different kinds of liquids.

Materials
plastic test tubes with covers
funnels
cooking oil
vinegar or apple juice
measuring cup
water colored with food coloring

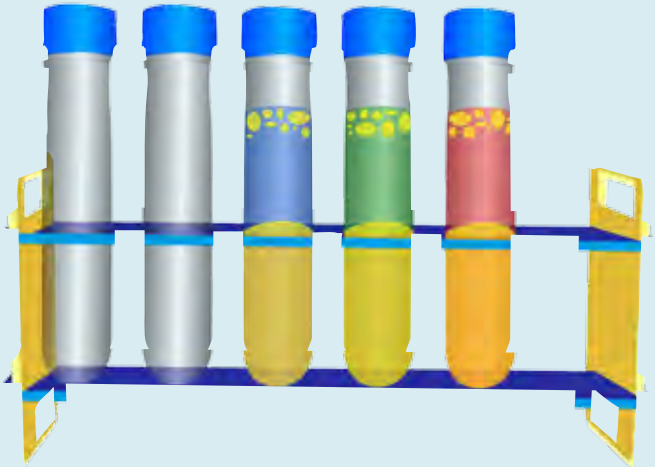
Books
Solids, Liquids, and Gases by Angela Royston
Change It! by Adrienne Mason
What Is a Scientist? by Barbara Lehn

Vocabulary
liquid
oil
vinegar
water

Approach
! In advance, check for food allergies and complete necessary paperwork.

Begin by reviewing what the children have already learned about liquids. Show the children the oil, vinegar, and water. Help the children identify the different liquids. Encourage the children to compare them using their senses of sight, taste, and smell.

Explain that you are going to do an experiment to see what happens when you mix different liquids together. Help a child fill a plastic test tube about half full with water using a funnel. Have another child add some vinegar. Cover tightly and shake. Ask the children to observe what happens. Explain that because the vinegar and water are very similar liquids, they mix together easily.



Repeat the steps using water and cooking oil. Draw the children's attention to the layer of oil that forms on top of the water after a few moments. Explain that because water and oil are very different liquids, they do not stay mixed together.

Extension 1

Add some liquid soap to a water and oil mixture. 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 plastic test tubes with colored water and with varying levels of oil or corn syrup and water. Seal tightly and have the children explore how the different liquids behave when the tubes are moved or shaken.

Extension 2

⚠ Make your favorite oil and vinegar salad dressing.

Integrated Experiences

Literacy: Help the children describe the experiment in their journals using words and pictures.

Experienc 3

Mixing Solids and Liquids

Science Concepts

Substances vary in the way they react with other substances.

Everything in the world is a solid, liquid, gas, or a combination.

Aim

Children will explore mixing solids and liquids.

Materials

clear plastic cups
spoons
container of warm water
salt
plastic test tubes with covers
assortment of solid substances (cornstarch, glitter, instant coffee)

Books

Solids, Liquids, and Gases by Angela Royston
Change It! by Adrienne Mason
What Is a Scientist? by Barbara Lehn
Duck Soup by Jackie Urbanovic
Purple Delicious Blackberry Jam by Lisa Westberg Peters

Vocabulary

disappear
dissolve
invisible
salt
stir
taste

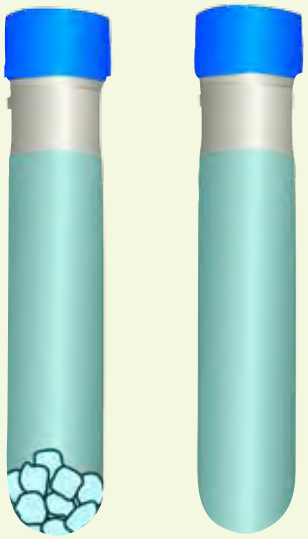
Approach

! In advance, check for food allergies and complete necessary paperwork. Experiment with the substances to determine the amounts needed to produce the best results.

Begin by reviewing what the children have already learned about solids and liquids. Show the children a few grains of salt and water and help them identify each as a solid or a liquid. Explain that they are going to explore what happens to the salt when it is mixed with a liquid.

Distribute cups to the children. Have the children pour water into their cups. Ask: *What will happen if you mix salt 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 salt into the water. Ask: *What is happening? Is the salt still in the water? Did it disappear? How can you find out?* Allow the children to take small tastes of the salt solution. Introduce the term “dissolve” and explain that mixing salt and water makes saltwater. Talk about how they know the salt is still in the water because they can taste it. Explain that even though they cannot see the salt, it is still there.



Extension

Explore dissolving further using materials such as sand and sugar. See if you can separate the solids from the liquids by pouring the mixture through coffee filters.

Science Center

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

Integrated Experiences

Literacy: Document the steps in the investigation using photographs.

Creative Arts (Art): Mix powdered paint with water and have the children paint.

Experienc 4

Introduction to Bubbles

Science Concepts

Substances have many observable properties including size, shape, mass, and color.

Everything in the world is a solid, liquid, gas, or a combination.

Aim

Children will explore making bubbles.

Materials

bubble solution
container of water
large and small round bubble wands
shallow trays to hold bubble solution
dish detergent
water table or shallow tubs

Books

Bubbles, Bubbles Everywhere by Dwight Kuhn & Melvin Berger
Pop! A Book About Bubbles by Kimberly Brubaker Bradley

Vocabulary

air
big
bubble
large
little
round
skin
slippery
small

Approach

In advance (up to one week), have the children help you mix up a batch of bubble solution. Pour some water in a container. Review the book so you can focus on the appropriate photos and ideas.

Begin by asking the children to share what they know about making bubbles: *Have you ever made bubbles? How do you make bubbles? What do you need to make bubbles?*

Review how you made the bubble solution. Encourage the children to feel the difference between the slippery soap solution and water.

Demonstrate how to make a bubble using a round bubble wand. Choose a clean wand and show that a bubble will not form using water alone.

Distribute the bubble wands and encourage the children to experiment. Ask: *What happens when you wave the wand quickly? Slowly? Can you make just one bubble?*

Ask the children to describe the bubbles: *What colors are they? Which one is the biggest? What shape are the bubbles?*

Conclude by reviewing what the children have learned about making bubbles.

Bubble Solution Recipe*

Mix together:
1/2 cup Dawn or Joy liquid dish soap
1 gallon water, preferably distilled
2-3 tablespoons corn syrup or glycerin

* works best if allowed to sit at least one day

Science Center

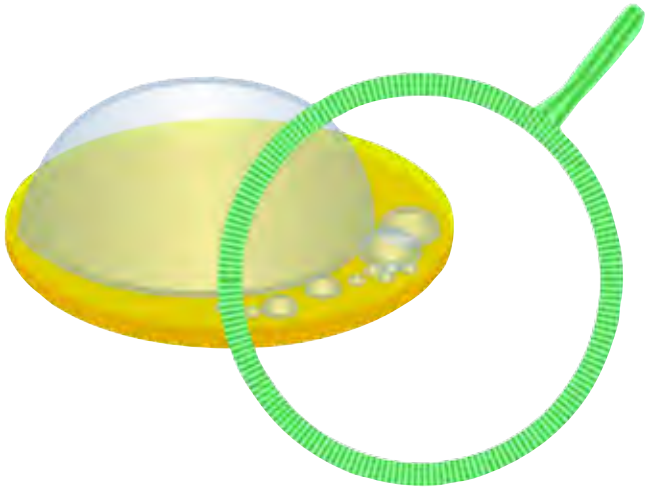
Fill the water table with a soapy solution to encourage the children to explore bubbles further.

Integrated Experiences

Literacy: Encourage the children to examine the bubbles carefully and to name the colors hey see. Make a list of the different colors they name.

Math 1: As the children make bubbles, encourage them to count the bubbles and compare the sizes.

Physical Health and Development (Gross Motor): Encourage the children to chase after the bubbles as they float in the wind.



Experienc 5

Experimenting with Bubbles

Science Concepts

Substances have many observable properties including size, shape, mass, and color.

Everything in the world is a solid, liquid, gas, or a combination.

Aim

Children will experiment with bubble makers of different shapes.

Materials

bubble solution
bubble wands of varying sizes and shapes
shallow trays to hold bubble solution
variety of liquids such as soap, soda, and milk
plastic test tubes with covers

Books

Pop! a Book About Bubbles by Kimberly Brubaker Bradley
Bubbles, Bubbles Everywhere by Dwight Kuhn & Melvin Berger

Vocabulary

air
big
bubble
large
little
round
skin
slippery
small
star

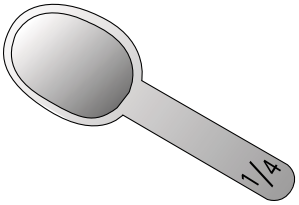
Approach

- In advance, prepare a batch of bubble solution.
- Begin by reviewing children's previous discoveries about bubbles: *How did we make bubbles? What color were they? What shape were the bubbles?*
- Show the children a round bubble wand and review that it made bubbles that were round like a ball.

- Show the children the other wands. Help the children identify the shape of each wand. Encourage the children to predict what shape bubble each wand will make: *Do you think the bubble will be round like a ball, or will it have a star shape?*
- Make a bubble with one of the wands that is not shaped like a circle. Draw the children's attention to the bubble's shape Talk about how all bubbles that float in the air are round.

Extension

Make bubble wands from common materials such as pipe cleaners, plastic holders from 6-packs of soda, and circles cut from the rims of yogurt carton tops.



Science Center

Pour a variety of liquids such as soap, milk, and soda into the plastic test tubes and place in the Center along with magnifying tools. Encourage the children to explore the bubbles that are made when the liquids are shaken.

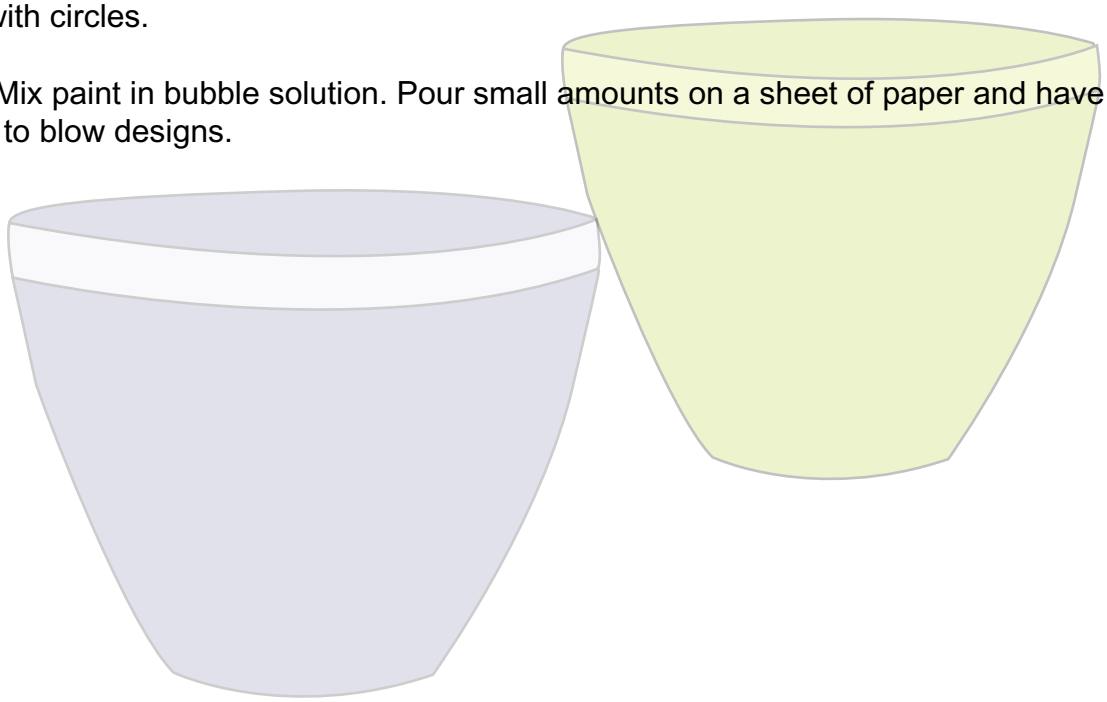
Integrated Experiences

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

Math 1: Graph the children's predictions about the shape the bubbles will take.

Math 2: Investigate the classroom and playground for other objects that are shaped like spheres. Compare spheres with circles.

Creative Arts (Art): Mix paint in bubble solution. Pour small amounts on a sheet of paper and have the children use straws to blow designs.



Experienc 6

Play Dough

Science Concepts

Everything in the world is a solid, liquid, gas, or a combination.

Combining substances can produce a new substance with new properties.

Aim

Children will participate in making play dough.

Materials

mixing bowl
measuring cup
mixing spoon
flour
salt
warm water
vegetable oil (optional)
food coloring (optional)

Books

Tallulah in the Kitchen by Nancy Wolff
What Is a Scientist? by Barbara Lehn
Why We Measure by Lisa Trumbauer
Pancakes for Breakfast by Tomie de Paola

Vocabulary

dough
fold
ingredients
knead
measure
mix
mixture
recipe

Approach

! In advance, check for food allergies and complete necessary paperwork.

Experiment with the play dough recipe and adjust proportions to meet your needs and preferences. Using the sample recipe on page 44 as a guide, make a chart using words and pictures that describe the steps you are going to follow.

Show the children the ingredients and the chart. Explain that you are going to mix the ingredients together following the steps shown on the chart.

Encourage the children to think about what the mixture is going to look and feel like: *When these are all mixed together, what will it feel like? Will the mixture be a solid or a liquid?*

Help the children measure and mix the ingredients. Draw their attention to the way the dough changes when the water and oil are added. Demonstrate how to knead the dough by pushing it down with the heels of your hands, folding it over, and folding it over again.

Extension

⚠ Experiment with the play dough recipe by varying the amounts of flour, salt, water, and oil, or add sand or birdseed to make textured dough, packets of flavored gelatin to make scented dough, or glitter to make a sparkly dough.

Science Center

Place the play dough in the Center for further exploration.

Play Dough Recipe

4 cups all-purpose flour
1 cup salt
1½ cup warm water
small amount of vegetable oil (optional)
food coloring (optional)

Mix flour, salt, water, and oil and food coloring (if desired) in a large bowl.

Stir with a spoon. Knead until shiny.

Store in an airtight container when not in use.

- Have the children knead the dough until it is smooth and elastic.
- As the children mix and knead the dough, ask them if it feels warm or cold, and to describe the texture and how it changes.
- When your dough is ready, review the steps you followed to make the dough.

Consider this...

Using recipes when cooking with children introduces another form of print and provides practical experience using measuring tools.

Experience 7

Changing Play Dough

Science Concepts

Substances have many observable properties including size, shape, mass, and color.

Physical actions can change the properties of materials.

Aim

Children will use a variety of tools to change the appearance of a substance.

Materials

play dough or clay
a variety of clay tools such as cutters, rollers, and stampers

Book

Change It! by Adrienne Mason

Vocabulary

cut
flat
rolling pin
round
stamp

Approach

Begin by reviewing what the children have already learned about solids. Show the children some play dough and ask for their ideas about ways to change what it looks like: *What can I do to make this ball smaller? Can I make it bigger? If I break it into pieces, can I put it back together again?*

Show the children the different clay tools. Help the children name the tools. Encourage them to describe how to use the tools: *How would I use this with play dough? What would I do with this one?*

Distribute the tools and play dough among the children. Encourage the children to describe their actions and what happens to the play dough as a result: *What does your play dough look like? How did you make it look like this? Can you do it again?*

Extension

Explore different ways of changing the size and shape of paper by cutting, tearing, bending, and folding. Talk about which actions can be reversed (e.g., folding) and which cannot (e.g., cutting).

Science Center

Place the play dough and tools in the Center for further exploration.

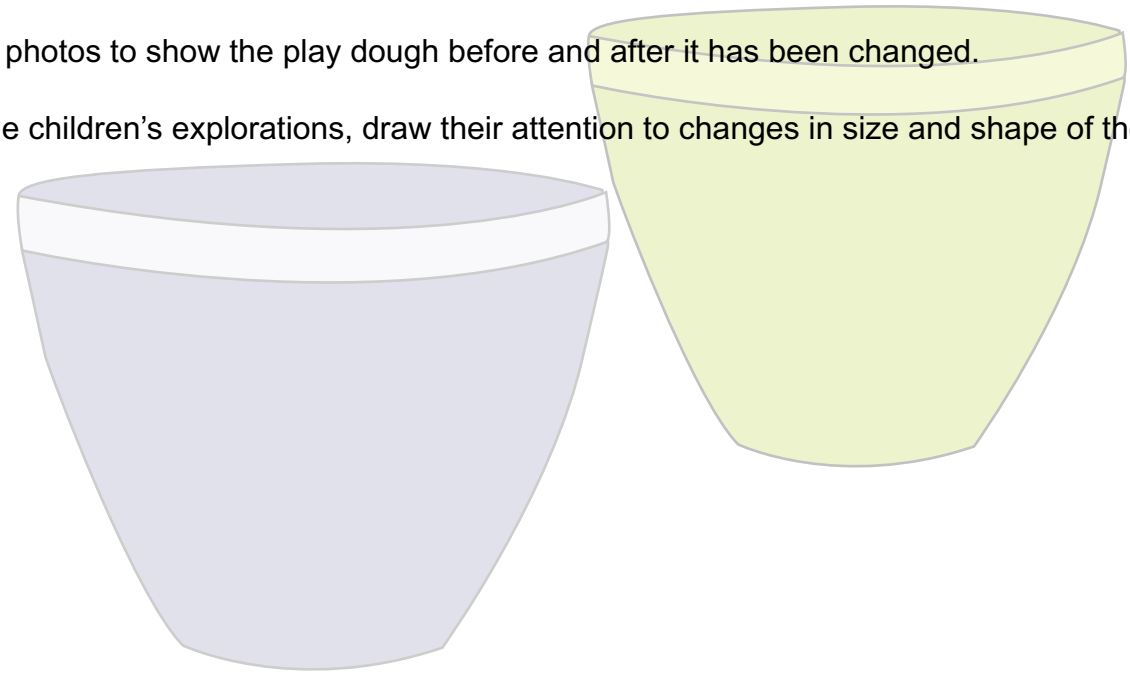
Integrated Experiences

Literacy 1: Have the children describe their explorations of the tools and clay in their journals using words and pictures.

Literacy 2: Make a class display that describes each of the clay tools. Supplement with photos or children's illustrations.

Literacy 3: Use photos to show the play dough before and after it has been changed.

Math: During the children's explorations, draw their attention to changes in size and shape of the play dough.



Experienc 8

Making a Gas

Science Concepts

Everything in the world is a solid, liquid, gas, or a combination.

Combining substances can produce a new substance with different properties.

Aim

Children will participate in an experiment in which a solid and liquid are combined to form a gas.

Materials

baking soda
vinegar
measuring cups
teaspoon
clear containers
food coloring (optional)

Books

Change It! by Adrienne Mason
Gases by Robin Nelson
Duck Soup by Jackie Urbanovic

Vocabulary

baking soda
gas
liquid
solid
vinegar

Approach

! In advance, check for food allergies and complete necessary paperwork. Try this experience in advance so that you know what to expect.

Show the children the vinegar. Ask: *Is this a solid or a liquid? How can you tell?* Have the children smell the vinegar and help them label it as "vinegar." Talk about different uses for vinegar.

Introduce the baking soda. Talk about what baking soda is used for. Explain that you are going to do an experiment to see what happens when the vinegar and baking soda are mixed together. Encourage the children to make predictions: *What do you think is going to happen?*

Ask a child to measure a small amount of vinegar into a clear container. Ask another child to add one teaspoon of baking soda to the vinegar. Focus the children's attention on the foam that forms in the container when the baking soda and vinegar mix.

Explain that when the baking soda and vinegar are mixed together, a gas is formed. This gas creates bubbles in the vinegar.

Have the children take turns combining the vinegar and baking soda. Encourage the children to experiment with different amounts of vinegar and baking soda. Add food coloring for added effect.

Extension 1

! Experiment with different ingredients. Substitute water or juice for the vinegar and compare the results.

Extension 2

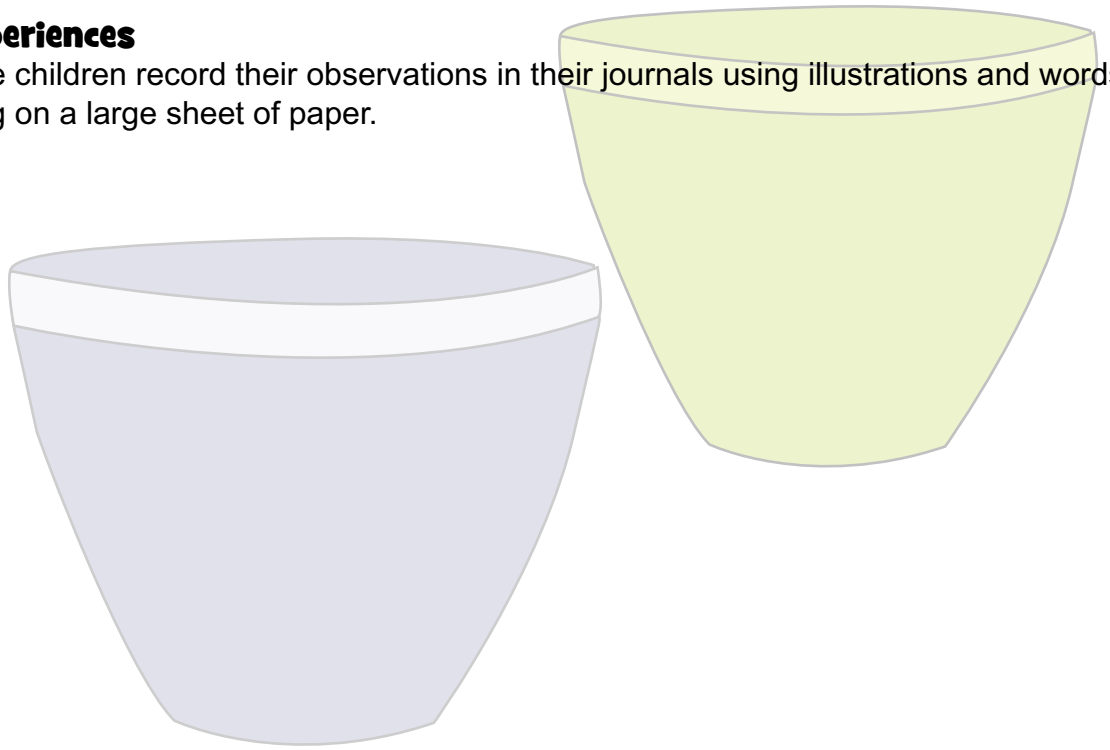
! Put 2 teaspoons baking soda into a balloon. Pour 1/2 cup vinegar into a small plastic bottle. Stretch the end of the balloon over the top of the bottle. Tip the balloon up to pour the baking soda into the vinegar. Watch as the gas inflates the balloon.

Extension 3

! Make “Orange Soda.” Combine 1 teaspoon baking soda, ¼ cup water, and ¾ cup orange juice.

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.



Experienc 9

Bread

Science Concepts

Combining substances can produce a new one with different properties.

Heating and cooling can change the properties of a substance.

Aim

Children will participate in making bread.

Materials

slice of bread
measuring cup
measuring spoons
8 ½" x 4 ½" x 2 ¼" loaf pan
dish towel
heavy-duty gallon sealable bag
oven
all-purpose flour
wheat flour
rapid-rise yeast
sugar
warm water
nonfat dry milk
salt
vegetable oil

Books

Bread Comes to Life by George Levenson
The Little Red Hen (Makes a Pizza) by Philomen Sturges
Walter the Baker by Eric Carle
The Pizza that We Made by Joan Holub
Blue Bowl Down by C. M. Millen
Why We Measure by Lisa Trumbauer

Vocabulary

bake
dough
knead
recipe
rise
yeast

Approach

⚠ In advance, check for food allergies and complete necessary paperwork. Experiment with the bread recipe and make adjustments as needed. Using the sample recipe on page 45 as a guide, make a chart using words and pictures that describe the steps you are going to follow.

Review with the children their experience with making play dough. Talk about the steps they followed and how the play dough differed from the ingredients that went into making it.

Show the children your chart and the ingredients for making bread. Explain that you are going to mix the ingredients together following the steps shown on the chart.

Show the children the yeast and explain that when the yeast is combined with warm water and the other ingredients, it produces a gas or air bubbles. These bubbles cause the dough to rise. Point out the holes in a slice of bread and explain that the holes were produced by air bubbles.

Using your chart, explain the steps you are going to follow to make bread. Help the children measure and mix the ingredients.

Throughout the process, encourage the children to use all of their senses to describe the changes that occur as the ingredients change into a loaf of bread.

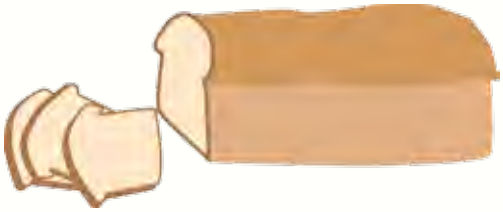
Extension

⚠ Make pizza dough and have the children add their own toppings.

Bread Recipe

2 cups all-purpose flour
1 cup wheat flour
1 packet rapid-rise yeast
3 tablespoons sugar
1 cup warm water
3 tablespoons nonfat dry milk
1 teaspoon salt
3 tablespoons vegetable oil

• Combine 1 cup all-purpose flour, yeast, sugar, dry milk, and salt in a bag. Seal bag and shake to mix.
• Add warm water and oil to bag. Reseal and mix by kneading the bag with hands.
• Add whole wheat flour to bag. Reseal and knead.
• Gradually add the remaining cup of all-purpose flour and continue mixing until dough no longer sticks to the sides of the bag and is smooth and elastic (about 2 to 4 minutes).
• Cover bag with a dish towel and place in a warm place. Let dough rise until it is doubled in size.
• Shape the dough into a loaf. Place loaf in an oiled pan. Cover and place in a warm spot. Let dough rise until it is doubled in size.
• Bake in the oven at 375 degrees for about 25 minutes.



Experience 10 Butter

Science Concepts

Everything in the world is a solid, liquid, gas, or combination.

Physical actions can change the properties of materials.

Aim

Children will make butter from cream.

Materials

1/4 cup heavy whipping cream per child
measuring cup
small container with lid per child
salt
spoons or knives (optional)
marble (optional)
bread or crackers (optional)
timer (optional)

Books

Solids, Liquids, and Gases by Angela Royston
Let's Make Butter by Eleanor Smith and Lyzz Roth-Singer
Pancakes for Breakfast by Tomie de Paola
Pancakes, Pancakes! by Eric Carle

Vocabulary

butter
cream
shake

Approach

⚠ In advance, check for food allergies and complete necessary paperwork.

Try making butter yourself before you work with the children so you know what to expect. Using the sample recipe on page 46 as a guide, make a chart using words and pictures that describe the steps you are going to follow.

- Show the children the whipping cream and review what the children have already learned about liquids. Ask the children if there is anything you could do to change the cream into something else.
- Using your chart, show the children the steps that you are going to follow to turn the cream into butter.
- Pour ¼ cup whipping cream into a small container and seal carefully. Vigorously

Extension

⚠ Use a whisk or electric mixer to make whipped cream from the heavy cream. Serve with fruit.

Integrated Experiences

Literacy 1: Help the children describe in their journals the steps they followed to make butter, or create a class log on a large sheet of paper.

Literacy 2: Help the children describe their favorite ways of eating butter using illustrations and words.

Math: Draw the children's attention to the clock and the time when they begin to shake the containers and to the time on the clock when they are finished.

Creative Arts (Music): Play lively music or sing a song as the children shake their containers and encourage them to shake in time with the music.

shake the container. (You may wish to add a clean marble to make it easier for the children to detect the changes).

- Shake for about 10 minutes. If you like, set a timer. You will be done when the cream has formed a clump that makes a thumping sound when you shake the container. Note: Whipped cream will form first. The children need to continue to shake the containers for butter to form.
- Open the container (if necessary, remove the marble) and pour off the liquid. Explain to the children that what remains is butter. Add a pinch of salt and stir. Spread the butter on bread or crackers and taste.

What's happening?

As you shake the container, the fat in the cream starts to clump together. Eventually, all of the fat comes together to form the butter.

Experience 11

Clean Mud*

Science Concepts

Everything in the world is a solid, liquid, gas, or combination.

Combining substances can produce a new substance with different properties.

Aim

Children will mix materials to create a new substance.

Materials

toilet paper
bar of Dove or Ivory soap, grated
warm water
measuring cup
mixing spoon
grater
assortment of tools and containers

Book

Bunny Cakes by Rosemary Wells

Vocabulary

grate
mix
soap
soft
white

Approach

In advance, grate the soap and begin tearing the toilet paper into pieces. Using the sample Clean Mud recipe on page 47 as a guide, make a chart using words and pictures that describe the steps you are going to follow.

Show the children the ingredients and help them identify the items as solids and liquids. Explain that you are going to mix the ingredients together. Encourage the children to predict what the mixture will look and feel like: *Will it be hard or will it be soft? What color will it be?*

Help the children follow the recipe as shown on your chart.

Encourage the children to describe the resulting substance and to compare its properties with the soap, toilet paper, and water that went into it.

Clean Mud Recipe*

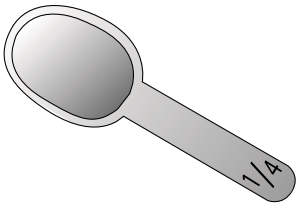
½ roll toilet paper
1 bar Dove or Ivory soap, grated
warm water

Tear paper into pieces. Mix with grated soap. Add water until the mixture feels like whipped cream.

*Recipe adapted from *The Cooking Book* by Laura J. Colker. NAEYC, 2005.

Extension

Go outdoors and gather ingredients for “real mud.” Encourage the children to experiment with the amount of sand or soil and water required to make mud, and to explore how adding other natural materials such as small stones or grass clippings changes the mud.



Science Center

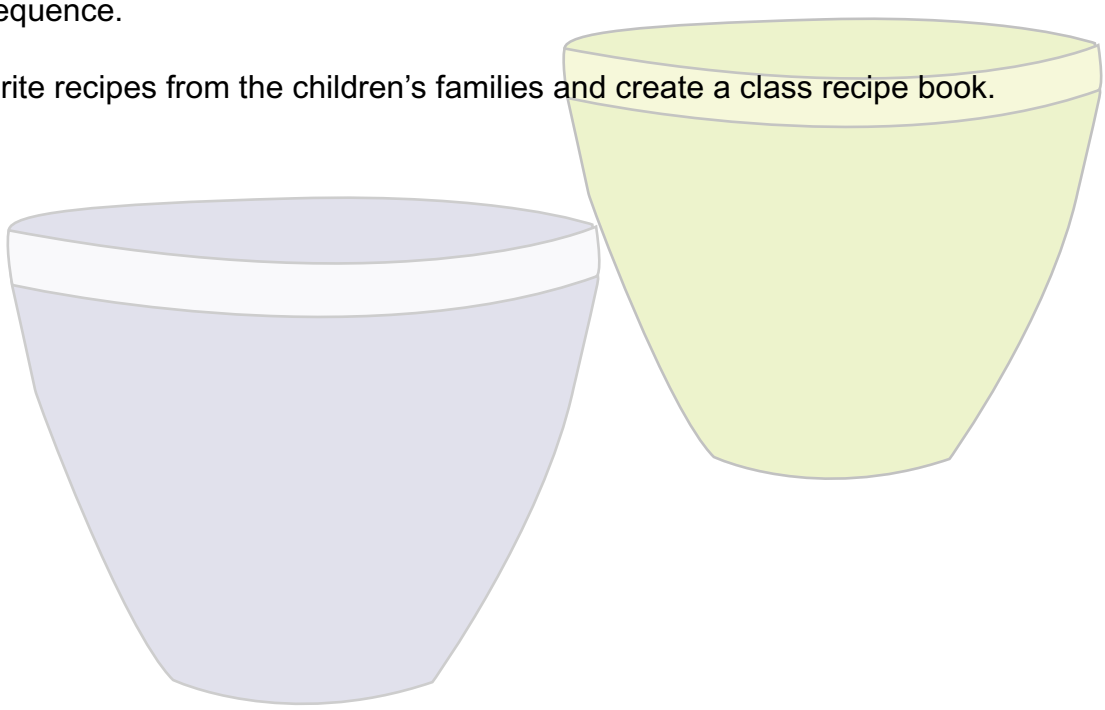
Place the clean mud along with a variety of tools and containers in the Center for further exploration.

Integrated Experiences

Literacy 1: Help the children describe the steps used in making clean, real mud, or some other mixture using words and pictures.

Literacy 2: Take photos of each step in making the mixture. Encourage the children to place the photos in the correct sequence.

Literacy 3: Gather favorite recipes from the children’s families and create a class recipe book.



Experience 12

Color Mixing I

Science Concepts

Substances have many observable properties including size, shape, mass, and color.

Physical actions can change the properties of materials.

Aim

Children will experiment with mixing colors.

Materials

red, yellow, and blue paints
paint brushes
paper
color equation cards
plastic test tubes with covers
food coloring
water
color glasses

Books

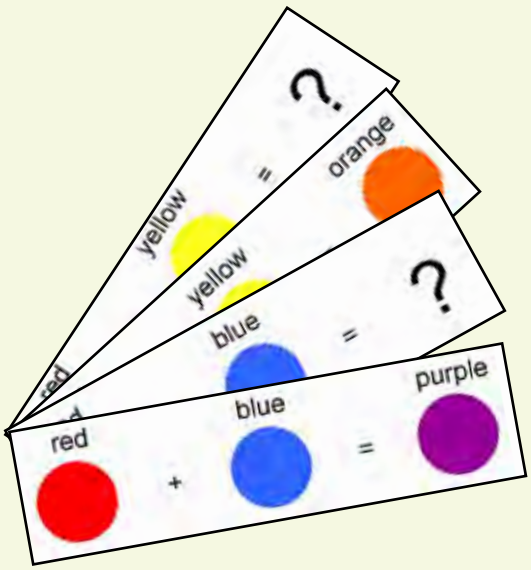
Mouse Paint by Ellen Stoll Walsh
Little Blue and Little Yellow by Leo Lionni
Warthogs Paint by Pamela Duncan Edwards

Vocabulary

blue
color
green
orange
purple
red
yellow

Approach

In advance, make "color equation cards."



Begin by asking the children to identify the colors of the paint. Explain that you are going to make some other colors by mixing red, yellow, and blue.

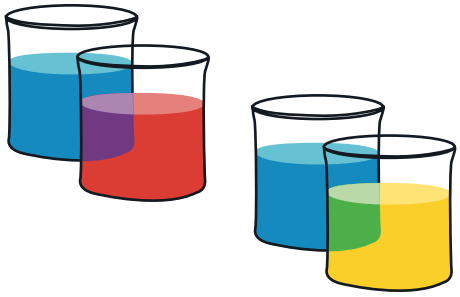
Select two colors (e.g., red and yellow). Ask the children to name the colors, then demonstrate how to carefully mix the colors together. Help the children name the new color.

Show the children the color equation card that matches your example. Discuss how mixing two colors produces a new one. Encourage the children to experiment with mixing colors in different combinations.

Encourage them to name the colors and predict what color they will get when they mix two or more colors together: *Okay, so you have red and blue. What color do you think you are going to make?* As the children continue to mix colors, ask: *What color did you make? What did you do to make that color?*

Extension

Have the children begin by selecting the color they want to make (e.g., brown, gray, magenta), then have them explore what color combinations will produce the desired effect.



Science Center

Place the color glasses and sealed plastic test tubes of red, yellow, and blue water in the Center for further exploration. Show the children how to make new colors by holding the tubes together and looking through them.

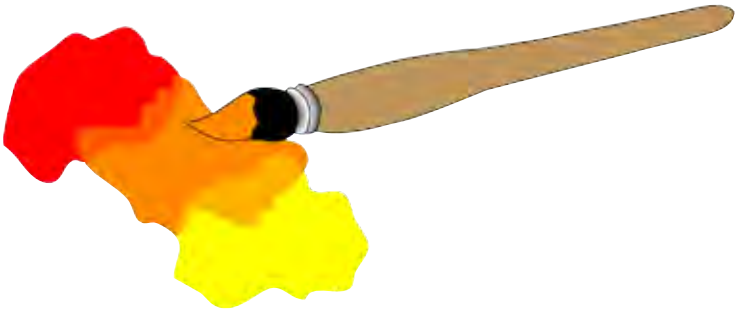
Integrated Experiences

Literacy: Have the children draw and write about their favorite color.

Math 1: Make a graph of the children's favorite colors.

Math 2: Identify the mathematical symbols on the color equation cards.

Creative Arts 1 (Art): Place small puddles of red, yellow, and blue paint on white paper or a paper plate. Cover with plastic wrap and have the children mix the colors together using their fingers. Pull the plastic wrap off and allow the designs to dry.



Experience 13

Color Mixing 2

Science Concepts

Substances have many observable properties including size, shape, mass, and color.

Physical actions can change the properties of materials.

Aim

Children will further explore mixing colors.

Materials

red, yellow, and blue food coloring
water
ice cube trays or small cups
freezer
color equation cards
small plastic cups or bowls
warm water
color glasses
plastic test tubes with covers

Books

Mouse Paint by Ellen Stoll Walsh
Little Blue and Little Yellow by Leo Lionni
Warthogs Paint by Pamela Duncan Edwards

Vocabulary

blend
blue
color
freeze
green
ice
melt
orange
purple
red
yellow

Approach

- In advance, make red, yellow, and blue ice cubes using water and food coloring.
- Using the color equation cards, review what the children have already learned about mixing colors.
- Show the children the ice cubes. Have the children name the colors. Ask the children what is going to happen to the ice as it warms up.
- Give the children small cups or bowls partially filled with warm water. Have each child pick ice cubes of two different colors. Ask the children to name the colors and to predict what color will result when the cubes begin to melt and the colors blend together.
- Encourage the children to experiment with adding a third ice cube.

Science Center

Place the color glasses and sealed tubes of red, yellow, and blue water in the Center for further exploration. Show the children how to make new colors by holding the tubes together and looking through them.

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: Gather a collection of small items such as buttons, bottle caps, or toys and have the children sort them by color and compare group sizes.

Creative Arts (Art): Have the children create collages using pictures of a single color.

Experience 14

Ice Pops

Science Concept
Heating and cooling can change the properties of a substance.

Aim
Children will make ice pops.

Materials
fruit juice
small cups
ice pop molds
freezer
ice cubes

Books
Change It! by Adrienne Mason
Solids, Liquids, and Gases by Angela Royston

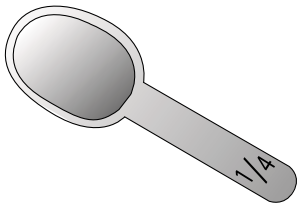
Vocabulary
cold
freeze
ice
liquid
solid

Approach
⚠ In advance, check for food allergies and complete necessary paperwork. Try out this experience yourself before working with the children so that you know the exact amount of juice required, as well as how long it will take for the juice to freeze. Review the books and mark the pages relevant to this experience.

- Begin by reviewing with the children what they already know about ice and how ice forms.
- Help the children fill the ice pop molds about three-quarters full with juice. Explain that you are going to put the molds in the freezer for several hours. Ask the children to predict what they think is going to happen to the juice.
- Once the juice pops are frozen, distribute the treats along with small servings of the same juice. Encourage the children to compare the ways in which the liquid juice and the juice pops are similar and how they are different: *Which one is a solid? Which one is a liquid? Which one can change its shape? Which one is colder? Do they taste the same or different?*

Extension

⚠ For another healthy snack, freeze sliced bananas. Compare the bananas in their frozen and unfrozen states.



Science Center

Place colored ice cubes or other frozen shapes in the water table for children to explore further.

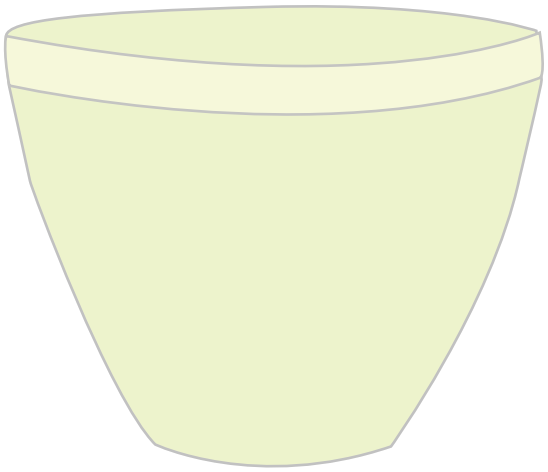
Integrated Experiences

Literacy: Help the children describe their favorite frozen treats in their journals using illustrations and words.

Math: Compare how much an equal amount of juice weighs as a liquid and after it is frozen.

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): Help the children play a game of *Freeze* where someone calls “freeze” and all players freeze in place.



Experienc 15

Ice Cream

Science Concept
Heating and cooling can change the properties of a substance.

Aim
Children will make ice cream.

Materials
half & half or whole milk
sugar
vanilla extract
rock salt
water
quart-size sealable freezer bags
gallon-size sealable freezer bags
small bowls or cups
spoons
ice

Books
From Cow to Ice Cream by Bertram Knight
From Milk to Ice Cream by Ali Mitgutsch
Why We Measure by Lisa Trumbauer

Vocabulary
cold
cream
freeze
ice cream
melt
recipe
rock salt
sugar
vanilla

Approach
! In advance, check for food allergies and complete necessary paperwork. Try this experience yourself before working with the children so that you know what to expect. Using the sample recipe on page 48 as a guide, make a chart using words and pictures that describe the steps you are going to follow.

- Begin by reviewing what the children already have learned about the effects of cooling from their experience making ice pops.
- Show the children the ingredients and explain that they are going to make ice cream. Encourage the children to identify the solids and liquids.
- Using your chart, review the steps they are going to follow to make ice cream.
- Explain that adding salt to the ice water is going to make the ice water so cold that the milk or cream will freeze, and that shaking and turning the bag adds air to the milk or cream.
- When the ice cream is ready, place in small dishes and enjoy!

Integrated Experiences

Literacy: Have the children describe making ice cream in their journals using words and pictures, or create a class log using photographs.

Math: Graph the children's favorite flavors of ice cream.

Creative Arts (Dramatic Play): Place ice cream scoops, paper cups, aprons, and other props in the dramatic play area to encourage play around an ice cream shop theme.

Social and Emotional: Take a field trip to a dairy farm.

Ice Cream Recipe (per serving)

1 cup half & half or whole milk
2 tablespoons sugar
½ teaspoon vanilla extract
½ cup rock salt
½ cup water
ice to half-fill gallon bag
1 quart-size sealable freezer bag
2 gallon-size sealable freezer bags

• Combine cream or milk with sugar and vanilla extract in the smaller bag and seal tightly, releasing as much air as possible from inside the bag.
• Fill the gallon-size bag half-way with ice. Add rock salt and water.
• Put sealed bag with milk mixture into the bag with the ice. Seal bag, releasing excess air. Then place this bag into another bag to protect from leaks.
• Shake and turn and flip and squeeze (gently) for 5 to 10 minutes.

What's happening?

• The rock salt lowers the water temperature to below freezing.
• The water allows the salt to take effect sooner, cutting the freezing time.
• About half of ice cream is air. Shaking and turning the bag adds air. Without the shaking, the milk would end up much like an ice cube.

Experienc 16

Popcorn

Science Concept
Heating and cooling can change the properties of a substance.

Aim
Children will observe how popcorn kernels change when heat is applied.

Materials
hot air popcorn popper
popcorn
salt
cups or bowls for serving

Books
Popcorn by Alex Moran
The Popcorn Book by Tomie de Paola
Purple Delicious Blackberry Jam by Lisa Westberg Peters
Duck Soup by Jackie Urbanovic
Warthogs in the Kitchen by Pamela Duncan Edwards

Vocabulary
hard
kernel
pop
popcorn
soft

Approach
! In advance, check for food allergies and complete any necessary paperwork.

Begin by asking the children to describe any experiences they have had with popcorn. Pass around some un-popped kernels and some popped corn. Draw their attention to the small parts of the kernel that can be seen in the popcorn. Ask: *How can we make the kernels open? What do we have to do to change the kernels into popcorn?*

Follow the directions for the hot air popper and make popcorn. Encourage the children to describe how the popcorn smells, sounds, and looks as it pops.

Talk about different ways to make popcorn such as using a microwave or a stove. Explain that changing a kernel of corn into popcorn requires heat. Explain that there is water inside the corn kernel. When the water gets hot, it turns into a gas and the pressure makes the kernel burst open.

Talk about how heat causes changes in other foods as well. For example, dry noodles and fresh carrots become soft when cooked, while pancake batter becomes firm when heated.

Extension

⚠ Explore the effects of heat on other foods: make pasta or applesauce, melt butter or cheese, toast bread, or make pancakes.

Integrated Experiences

Literacy 1: Have the children describe in their journals the characteristics of popped popcorn and unpopped popcorn.

Literacy 2: Make a chart showing the steps in making popcorn. Include photographs or the children's drawings.

Literacy 3: Make a class display showing what happens when heat is applied to items such as bread, butter, candles, pasta, and vegetables.

Math 1: Compare the weight of popped and unpopped popcorn using a balance scale.

Math 2: Practice estimation using popped popcorn. After showing the children what 10 popped kernels look like, ask the children to estimate other quantities. Count to check the estimates.

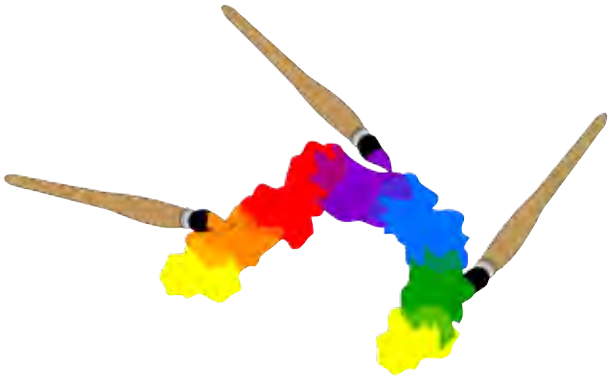
MESS® Take-Home Kit Information/Experience Card

Kitchen Science

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

In this Kit you will find:

- *Mouse Paint* by Ellen Stoll Walsh
Three mice jump in paint and learn about mixing colors.
- Color paddles



This month, your child is learning:

- Mixing different colors together will make a new color.

How to use this book:

- Ask your child to name the colors on each page.
- When you finish the story, ask: *Why did the mice leave some of the paper white?* (Read the first two pages of the book to find the answer).
- Read the story again and before you turn the pages, ask: *What are the mice going to do? What is going to happen to the puddle?*

How to use the object:

- Overlap two color paddles and hold them up to a light. See the new color that forms! Try making other colors with different paddles.

To further support your child's learning:

- Help your child make new colors by mixing paints. Or use food coloring and make red, yellow, and blue ice cubes. Put two colors of cubes in a cup and watch what happens when they melt.
- Play a game of “I Spy” with colors: *I spy something red...*
- Mix colors on your computer! Play “Paint Splat” at:
http://www.peepandthebigwideworld.com/about/games.html

Kitchen Science

Recipe Book

MESS
Marvelous Explorations through Science and Stories

PLAY DOUGH

You will need:

1 ½ cups warm water

4 cups flour

1 cup salt

2 measuring bowls

measuring cup

mixing spoon

1

Mix 4 cups flour, 1 cup salt and 1 ½ cups warm water together in a bowl.

2

Add food coloring and stir with spoon.

3

Knead until dough is shiny.

4

Roll out dough and cut out shapes.

5

Store leftover dough in an airtight container to reuse.

BREAD IN A BAG

You will need:

vegetable oil

dry milk

flour (all-purpose and whole wheat)

sugar

rapid rise yeast

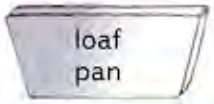
salt

measuring spoons

dishtowel

1 cup hot water

measuring cup (1 cup)


loaf pan

rolling pin

1 gallon heavy duty bag with zipper lock

1

Combine 1 cup all-purpose flour, yeast, 3 Tbs. sugar, 3 Tbs. dry milk, and 1 tsp salt in a bag. Squeeze out air and seal bag. Shake to mix.

2

Add 1 cup hot water and 3 Tbs. oil to bag. Reseal and mix by kneading the bag with hands.

3

Add 1 cup whole wheat flour to bag. Reseal and knead.

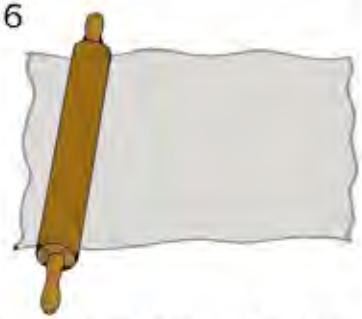
4

Gradually add the remaining cup of all-purpose flour and continue mixing until dough no longer sticks to the sides of the bag and is smooth and elastic (about 2 to 4 minutes).

5

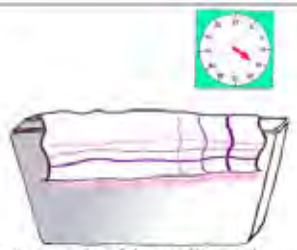
Cover bag with a dishtowel and place in a warm spot.

6



Remove dough from bag and roll into a 12x7 inch rectangle

7



Shape into a loaf by rolling the narrow end of the dough. Place loaf in an oiled pan. Cover and place in a warm spot. Let dough rise until it is doubled in size (about 20 minutes).

8

Bake in the oven at 375 degrees for 25 minutes.

MAKING BUTTER

You will need:

Heavy Cream

Container with top

Measuring Cup

Salt

1

Pour ¼ cup of heavy cream into measuring cup.

2

Pour ¼ cup heavy cream into container. Close top of container.

3

Shake container for ten minutes. Whip cream will form first; shake until butter forms.

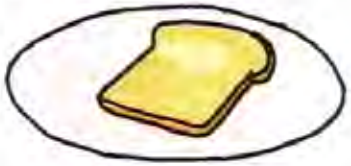
4

Open container. Pour off excess liquid.

5

Add two shakes of salt and blend into butter.

6



Spread on bread and eat. Enjoy!

CLEAN MUD

You will need:

½ roll of toilet paper

bar of soap

2 cups warm water

measuring bowl

mixing spoon

grater

1

Tear toilet paper into small pieces about 2 inches square.

2

Place toilet paper squares into the mixing bowl.

3

Grate soap into the mixing bowl.

4

Mix with hands.

5

Gradually add water.

6

Mix after each water addition.

7

Mud is ready when it feels like whipped cream.

ICE CREAM

You will need:

sugar

vanilla extract

whole milk

measuring spoons (1 tbsp. and ½ tsp.)

measuring cup (1 cup)

quart or pint size bag

gallon size bag

ice cubes

rock salt

1

Combine 1 cup of whole milk, 2 tablespoons of sugar, and ½ teaspoon vanilla extract in pint or quart bag.

2

Seal the bag tightly releasing as much air as possible. Shake bag until sugar dissolves into mixture.

3

In gallon size bag, fill more than halfway with ice. Add ½ cup rock salt and ½ cup of water.

4

Put sealed Ziploc with whole milk mixture into larger gallon bag filled with ice.

5

Release excess air from larger gallon bag. Make sure bag is <u>sealed shut.</u>

6

Shake and turn and flip for 5 minutes. Use garden gloves or paper towels to protect hands.

Kitchen Science

Recommended Books

Bradley, Kimberly Brubaker. *Pop! A Book about Bubbles*. New York: HarperTrophy, 2001. Simple text and beautiful close-up photographs introduce both the how-to and the excitement of making bubbles. A recipe is included. The only bad news is that bubbles always pop!

Carle, Eric. *Pancakes, Pancakes*. Saxonville, MA: Picture Book Studio, 1995. Young Jack wants pancakes for breakfast, but first has to grind the wheat, collect an egg, milk a cow, churn the butter, and so on. Vibrant collages showing Jack hard at work invite conversation about where food comes from. A recipe is included.

Carle, Eric. *Walter the Baker*. New York: Simon and Schuster, 1995. After serving the Duke a bad-tasting bun, Walter is commanded to invent a good-tasting roll that the "sun can shine through three times." After a frustrating night with no success, Walter accidently invents the pretzel!

Christian, Eleanor, and Lyzz Roth-Singer. *Let's Make Butter.* Mankato, MN: Yellow Umbrella Books, 2001. This small-format book begins with the concept of change, then photographs and simple sentences detail the process of making butter. A step-by-step review page and glossary/index are included.

De Paola, Tomie. *Pancakes for Breakfast*. New York: Harcourt Brace Jovanovich, 1978. A lady begins the snowy day thinking of a stack of fluffy pancakes! This (mostly) wordless picture book follows her trials as she gathers ingredients around her farm. Doomed to failure by her dog and cat, she ultimately finds the pancakes she so desires—next door. The delightful illustrations include a reference to a recipe, and "thought bubbles" that promote conversation.

De Paola, Tomie. *The Popcorn Book*. New York: Holiday House, 1978. Two boys, encouraged by a TV ad, decide to make popcorn. Wondering aloud why popcorn kernels are kept in the refrigerator, they find a book that discusses popcorn's worldwide history, statistics, and why popcorn pops. Cartoon illustrations add to the plot. The more sophisticated concepts can be edited when reading with young children.

Edwards, Pamela Duncan. *Warthogs in the Kitchen: A Sloppy Counting Book*. New York: Hyperion Books for Children, 1998. Warthogs in the kitchen? It's a strange concept, but weaves in counting 0-10, measuring, cleanliness, various liquid/solid ingredients, effects of heat, and a recipe. And what rhyming fun they have making cupcakes!

Kitchen Science

Edwards, Pamela Duncan. *Warthogs Paint: A Messy Color Book.* New York: Hyperion Books for Children, 2001. Gloomy, rainy days call for indoor activities, so the warthogs decide to paint their kitchen. While they lack a specific plan, colors give them rhyming ideas as they discover what happens when primary colors are mixed.

Holub, Joan. *The Pizza that We Made.* New York: Viking Books, 2001. Easy-to-read rhyming text describes the steps in making a pizza, including measuring ingredients, mixing, and folding the dough. Bright illustrations show three active, young children and an adult helper. A recipe is included.

Knight, Bertram. *From Cow to Ice Cream: A Photo Essay.* New York: Children's Press, 1997. Can you imagine a world without ice cream? But where does ice cream come from? Colorful close-up photography and simple text show the process of turning raw milk into tasty frozen treats of many flavors and shapes.

Kuhn, Dwight, and Melvin Berger. *Bubbles, Bubbles Everywhere*. New York: Newbridge Educational Publishing, 1994. In big book format, simple rhyming text accompanies large close-up photographs of different kinds of bubbles. The excitement of all the places you can find/make bubbles is conveyed with enthusiasm.

Lehn, Barbara. *What Is a Scientist?* Brookfield, CT: Millbrook Press, 1998. "A scientist is a person who . . . " Simple text, that can be read on multiple levels, and color photographs of children describe the work that scientists do: questioning, observing, experimenting, drawing, etc. Most are applicable in Kitchen Science activities.

Levenson, George. *Bread Comes to Life: A Garden of Wheat and a Loaf to Eat*. Berkeley, CA: Tricycle Press, 2004. After several pages of yummy-looking examples, beautiful color photographs depict the steps in making bread, starting with seeds in the garden. Close-up photos with good descriptive words show measuring tools, ingredients, and dough. Several projects, including a recipe with directions for "any 4-year-old, with an adult helper," are included.

Lionni, Leo. *Little Blue and Little Yellow*. New York: HarperCollins, 1959. When best friends little blue and little yellow hug, they turn green. Once their parents figure out what is happening, all is right with the world again. Because all the characters are pictured as abstract splotches, the reader's eyes remain focused on the colors.

Mason, Adrienne. *Change It! Solids, Liquids, Gases and You.* Tonawanda, NY: Kids Can Press, 2006. "Matter is all around you." Limited text, colorful cartoon illustrations, and several step-by-step activities explain the solid, liquid, and gaseous states of matter.

Kitchen Science

Millen, C.M. *Blue Bowl Down: An Appalachian Rhyme.* Cambridge, MA: Candlewick Press, 2004. Almost a lullaby and certainly poetic, the tradition and process of making bread is beautifully illustrated. An Appalachian mother and toddler start the process together by getting down the blue bowl.

Mitgutsch, Ali. *From Milk to Ice Cream*. Minneapolis, MN: Carolrhoda Books, 1979. This small-format book with simple text and illustrations (that begin with a cow, of course) appeals to young children who want to know how things work.

Moran, Alex. *Popcorn.* New York: Green Light Readers/Harcourt, 2003. A bouncy, rhyming text and busy illustrations in vibrant colors promote the active experience of popping corn. Excessive measurements almost cause a disaster, but all ends well. An activity for the leftover popcorn is included.

Nelson, Robin. *Gases*. Minneapolis, MN: Lerner Publications, 2005. Photographs of familiar examples and simple text explain a hard-to-understand concept. “Great Gas Facts,” a glossary, index, and page about air pollution are included at the end of this small-format book.

Peters, Lisa Westberg. *Purple Delicious Blackberry Jam*. New York: Arcade Publishing, 1992. While visiting Grandma, Freddy and Muff ask to make blackberry jam, an activity that begins with a berry-picking adventure and includes a recipe. Things do not quite turn out as planned, but the process is great fun. Wispy, active, messy illustrations fit the descriptive text.

Royston, Angela. *Solids, Liquids, and Gases*. Chicago: Heinemann Library, 2002. This introductory book gives examples of liquids, solids, and gases that will be familiar to young children. Ways to tell the difference between the three states are included. The hard-to-understand issues of “tiny” solid pieces (e.g., flour, baby powder), mixing different states, melting and freezing, and steam also are covered.

Sturges, Philemon. *The Little Red Hen (Makes a Pizza)*. New York: Dutton Children’s Books, 1999. This contemporary adaptation of the classic tale of *The Little Red Hen* focuses on the ingredients and steps involved in making a pizza. Delightful cut-paper illustrations show reluctant friends–until eating time. These friends at least help with the clean-up.

Trumbauer, Lisa. *Why We Measure.* Mankato, MN: Yellow Umbrella Books, 2003. Tools to measure height, length, distance, speed, weight, quantity, and size are all included in simple text and detailed photographs. This small-format book provides a good introduction to the concept of measurement, although not all of the tools shown are used in the Kitchen Science unit.

Kitchen Science

Urbanovic, Jackie. *Duck Soup*. New York: HarperCollins, 2008. Active, detailed illustrations tell a dramatic story of Max, the duck who works to create his own unique soup recipe. Max measures oil, he smells and tastes his creation, and steam rises from the hot soup pot, but still something is missing. While he is out in the garden looking for the missing flavor, friends erroneously bring the creation to a safe but disastrous conclusion. Poor Max will have to start all over again, but at least he isn't duck soup!

Walsh, Ellen Stoll. *Mouse Paint*/*Pinta ratones.* San Diego, CA: Harcourt Brace Jovanovich, 1989. Simple, colorful illustrations and brief text tell the story of three white mice that find three jars of paint and discover both primary colors and color mixing. They also demonstrate the value of camouflage. Mixing colors has never been more fun!

Wells, Rosemary. *Bunny Cakes*. New York: Penguin Books, 1997. Grandma's birthday is the occasion for two cakes–an earthworm one and an angel surprise one with raspberry fluff icing–one made by Max and one by his sister. Spills by Max, the clumsy younger rabbit, require numerous trips to the grocer for replacement ingredients. Written grocery lists and a sign are key elements of the plot.

Wolff, Nancy. *Tallulah in the Kitchen.* New York: Henry Holt, 2005. Tallulah is a cat, but she loves to cook. Pancakes are her specialty. She uses a recipe, makes lists, shops, has appropriate tools, follows the rules, shares her results, and generally has a good time. Some of the humor in the asides is lost on young readers, but the bright colors in the detailed illustrations provide great observation practice.

Other Recommended Books

Blackstone, Stella, and Nan Brooks. *Making Minestrone.* New York: Barefoot Books, 2000. Friends gather to make soup. Their mission starts in the garden, before they proceed to the kitchen for cooking. Lots of cleaning, slicing, and frying (though no measuring) goes on. A recipe to serve four is provided.

Brandenberg, Alexa. *Chop, Simmer, Season.* New York: Harcourt Brace, 1997. Two young chefs demonstrate the skills they use at the Top Notch Restaurant. One action word (peel, mash, melt) accompanies each colorful illustration. This book works best when broken into small sections.

Cousins, Lucy. *Maisy Makes Gingerbread*. Cambridge, MA: Candlewick Press, 1999. Simple text (one sentence per page) and bold, primary-color illustrations describe the steps Maisy the mouse follows as she makes gingerbread. Friends enjoy the results.

Kitchen Science

De Paola, Tomie. *Watch Out for the Chicken Feet in Your Soup.* NY: Simon & Schuster Books for Young Readers, 1974. Grandmothers sometimes require some patience, especially Joey's Italian one (her house is full of funny old stuff). She serves Joey and his friend Eugene chicken soup and spaghetti. And since Eugene finished eating first (in spite of the chicken feet in his soup), he is invited to help her with the final steps in baking bread. Joey is a bit upset at Eugene's special treatment but learns he, too, is special when she gives both boys treats to take home. A recipe is included.

Dodd, Emma. *Dog's Colorful Day*. New York. Dutton's Children's Books, 2001. The lovable Dog (that's his name) begins the story looking pristine white with one black spot on his ear. By the end of the day, Dog has 10 different-colored spots, acquired in various misadventures. Counting the spots and naming their colors is good observation practice, and the book could complement color mixing.

Evans, Lezlie. *The Bunnies' Picnic*. New York: Hyperion Books for Children, 2007. What starts as a simple stew-making project (by numbered bunnies), turns into a messy disaster. The day is saved, however, by a night picnic. Detailed but gentle illustrations and rhyming text tell the evolving story.

Finch, Mary. *The Little Red Hen and the Ear of Wheat*. Brooklyn, NY: Barefoot Books, 1999. This rendition of the classic tale (hen gets no help from friends until time to eat) includes an illustration of the hen kneading and baking the dough and a recipe for whole wheat bread. The bold illustrations include her kitchen, the tools she uses to make the bread, and her oven.

Hoban, Tana. *Is It Red? Is It Yellow? Is It Blue?* New York: Greenwillow Books, 1978. Bright, familiar photographs and no words encourage readers to find the colors represented by colored dots on each page. Small groups and individuals could use this as a vocabulary builder (as you talk about the pictures, shapes, and sizes) as a complement to color mixing.

Hulme, Joy N. *Bubble Trouble*. New York: Children's Press, 1999. Cartoonish children take on the round shape of bubbles as the children dip and blow–and have fun–as the bubbles grow and fly up in the sky. And pop, of course!

Jonas, Ann. *Color Dance.* New York: Greenwillow Books, 1989. Young dancers show the effects of mixing different colors using scarves of red, yellow, blue, white, black, and grey. In addition to common color names, terms such as chartreuse and vermillion are introduced.

Kitchen Science

Katzen, Mollie, and Ann Henderson. *Pretend Soup and Other Real Recipes*. Berkeley, CA: Tricycle Press, 1994. A renowned cookbook author/illustrator and an early childhood educator team up to write a cookbook especially for young children. Each recipe includes a step-by-step picture version, plus a traditional version, cooking and safety tips, tool list, and the adult role in the learning/cooking process. Recipes for treats such as Bagel Faces, Number Salad, and Green Spaghetti are included.

Katzen, Mollie. *Salad People and More Real Recipes.* Berkeley, CA: Tricycle Press, 2005. The author/illustrator of *Pretend Soup* has added another 20 healthy, child- and family-tested recipes. She uses the same double treatment as before: two pages for the adult helper and two pages of a pictorial version for children. Safety is again highlighted in all recipes, including Tiny Tacos, Counting Soup, and Corny Corn Cakes.

Kimmel, Eric A. *The Gingerbread Man.* New York: Holiday House Books, 1993. A brightly colored, fast-paced retelling of an old classic: a freshly baked gingerbread cookie comes to life and runs from everyone he encounters, until a clever fox “befriends” him. This version has a happy ending, however—gingerbread men return whenever anyone bakes gingerbread.

Kleven, Elisa. *Sun Bread*. New York: Dutton Children’s Press, 2001. An animal baker breaks the winter gloom by baking a yummy sun-shaped loaf of bread. Descriptive rhyming text and colorful, detailed illustrations show baking tools and ingredients.

Muth, Jon J. *Stone Soup*. NY: Scholastic, 2003. This version of the classic *Stone Soup* uses three traditional Chinese characters whose trickery results in teaching rather than personal gain. While a bit long for group reading, the story’s beautiful watercolor and ink illustrations invite conversation about the details of the soup-making.

Rattigan, Jama Kim. *Dumpling Soup*. Boston: Little, Brown, 1993. Marisa, a young girl in a large extended Hawaiian family that celebrates the New Year holiday together, gets to help make the dumplings for Grandma’s soup this year. Family, cooking, kitchen, and respect for cultural diversity are prominent features. Text is a bit long for young children, but the gentle illustrations invite lots of conversation. A pronunciation glossary is included at the beginning.

Robinson, Fay. *Solid, Liquid, or Gas?* New York: Children’s Press, 1995. The properties of solids, liquids, and gases–the basic states of matter–are explained with simple text, familiar examples, and color photographs in this small-format book.

Royston, Angela. *Hot and Cold*. Chicago: Heinemann Library, 2002. Temperature, thermometers, cooking, freezing, and melting are discussed in limited text and pertinent photographs, although not necessarily in a Kitchen Science context. This book includes a glossary, bibliography, and index.

Kitchen Science

Seeger, Laura Vaccaro. *Lemons Are Not Red.* Brookfield, CT: Roaring Brook Press, 2004. Familiar objects, in cutout shapes only, are described in terms of the colors they are–and are not. The colors and objects serve as conversation starters and complement the color mixing concept. 2005 ALA Notable Book

Wellington, Monica. *Pizza at Sally's.* New York: Dutton Children's Books, 2006. Sally's business, the making of pizza from scratch, is described in simple, limited text and bright, cheery illustrations. Pictured vegetables seem to be photographs, adding to the collage look. A pizza recipe is included.

Wilson, Karma. *Whopper Cake*. New York: Margaret K. McElderry Books, 2007. Grandpa has a hankering to make a birthday cake for grandma. He checks his cookbook, but adds more—much more—of all the ingredients than is called for. He ends up with a cake that fills the back of a pickup truck! The bouncy rhyming text includes many number names while the bold illustrations invite counting. This tall tale concludes with a nice message about cleaning up, plus a recipe for chocolate cake.

Wing, Natasha. *Jalapeño Bagels*. New York: Atheneum Books for Young Readers, 1996. Pablo needs to take something to school for International Day to represent his Mexican and Jewish heritage. There are lots of choices in his parents' *panaderia*, but deciding is hard. Ample text will make this book hard for some. However, the detailed, warmly-colored illustrations are easy conversation starters, both about bakery processes and cultural differences.

Zoehfeld, Kathleen Weidner. *What Is the World Made Of? All about Solids, Liquids, and Gases.* New York: HarperCollins, 1998. After some silly but thought-provoking examples, "matter" and its three states are introduced. For young children, the book can be read via pictures and conversation bubbles.

Head Start Domains and Indicators Associated with Core and Center Experineces

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 Experineces

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 Experineces

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 Experineces

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 Experineces

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 Experineces

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 Experineces

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 Experineces

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.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	