



# PRESCHOOL STEM Teaching Units

Ages 2.9–5 years

[www.massaudubon.org/education](http://www.massaudubon.org/education)

- Our Feathered Friends
- Digging into Soil
- Tree-mendous Trees
- Wicked Cool Weather

This set of teaching units was produced in 2014 by the Massachusetts Audubon Society and may be freely used by preschool educators.



Mass Audubon works to protect the nature of Massachusetts for people and wildlife. Together with more than 100,000 members, we care for 35,000 acres of conservation land, provide school, camp, and other educational programs for 225,000 children and adults annually, and advocate for sound environmental policies at local, state, and federal levels. Founded in 1896 by two inspirational women who were committed to the protection of birds, Mass Audubon is now one of the largest and most prominent conservation organizations in New England. Today we are respected for our sound science, successful advocacy, and innovative approaches to connecting people and nature. Each year, our statewide network of wildlife sanctuaries welcomes nearly half a million visitors of all ages, abilities, and backgrounds and serves as the base for our work. To support these important efforts, call 800-AUDUBON (800-283-8266) or visit [www.massaudubon.org](http://www.massaudubon.org).

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The Brain Building in Progress campaign is a public/private partnership of the Massachusetts Department of Early Education and Care, United Way of Massachusetts Bay and Merrimack Valley and a growing community of early education and child care providers, academic researchers, business leaders and individuals. Our work is based upon the latest science and research on early childhood development. Our mission is to raise awareness of the critical importance of fostering the cognitive, social and emotional development of young children by emphasizing its future impact on the economic prosperity of everyone in Massachusetts. We welcome the business, education, and policy-making communities, as well as members of the media to be part of this crucial venture. By giving a strong start to our youngest citizens, we create a stronger, more prosperous future for all.

Learn how you can take action for young minds and Massachusetts' future at [www.brainbuildinginprogress.org/](http://www.brainbuildinginprogress.org/)

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**Y**oung children learn about the world around them by using their five senses while being mentored by a caring adult. By observing and learning about the natural world in classroom learning stations, outside in the school yard setting, and in their local communities, children can acquire an increased understanding about natural science and the world.

These units are designed for educators to teach our youngest stewards about birds, weather, trees, and soils. These are all topics that can be taught and explored in any setting. The investigations are designed to develop inquiry, knowledge and enthusiasm and are not dependent on having access to a large outdoor space. We encourage you to adapt these experiences to suit your preschool setting and the needs and interests of your students.

These investigations contain a variety of inquiry-based questions and supporting indoor and outdoor activities for varied ability levels of preschoolers. Please use them as presented or as a guide to enhance your own curriculum. The number of days or weeks you spend exploring a topic is flexible and should be led by the inquiry of the children.

Getting outside is the most important factor for engaging young scientists in their environment. The important thing is to spark observation, in the best ways you can, always determined by your location and what you know will work best for your students. Your enthusiasm and flexibility is key.

Outdoor natural history observations and lessons often present wonderful teaching moments that are unexpected. Some of the most memorable experiences observing and engaging with nature are those which are not planned. Enjoy these moments with your students. Explore together. It is all a learning experience!





## What we strive for

At Mass Audubon we strive to create learning experiences that are enriching, innovative, meaningful, and engaging. Our preschool programs support Massachusetts Science, Technology, and Engineering Standards. Our network of wildlife sanctuaries and nature centers located in urban, suburban, and rural communities around the state enable us to develop, evaluate, and sustain nature-based early childhood education programs in all settings. We are fully committed to creating a positive and supportive learning environment that is inclusive, open to all learners, and sensitive to cultural diversity.

## Place-based Learning

Place-based learning is an educational philosophy that connects learning to what is local to the learner. As children, we develop an understanding of where we are and what this place is like. It might be the child's backyard, local park, beach, forest or meadow. By learning and understanding your own city, town, or neighborhood, as you grow you have the power and commitment to become an active part of that community.

## Play-based Learning

Play-based learning in nature takes advantage of a child's innate curiosity in the world around them and, like all play-based learning utilizes discovery as a motivator in learning by supporting children as they choose activities that engage and match their own interests and ideas. Teachers create learning environments that encourage play and exploration in the natural world and even step aside to let child engage directly with the wonder of nature to guide curriculum. Nature play encourages and provides opportunities for children to construct their own surroundings, design tools and materials, develop give-and-take of social relationships, and solve problems as individuals and part of a team.

## Inquiry-based Learning

Inquiry-based learning is focused on teamwork, being learner-centered, questioning ourselves and the world around us, providing a more focused, time-intensive exploration, promoting lifelong learning, communication, and learning as fun.

## Embracing the serendipity of outdoor exploration

Nature exploration is dependent upon the weather and other conditions. A class might observe different wildlife than they expected to see. An outdoor lesson can sometimes provide unexpected, but enriching teachable moments on a natural history topic that was not planned. Enjoy and celebrate the learning and discovery that nature will offer your classroom.

# Brain Building in Progress



## Building Young Brains and a More Prosperous Future For All

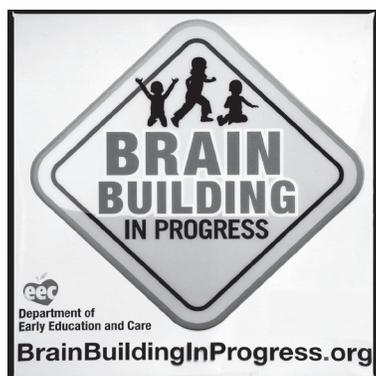
The Brain Building in Progress campaign is a public/private partnership of the Massachusetts Department of Early Education and Care, United Way of Massachusetts Bay and Merrimack Valley and a growing community of early education and child care providers, academic researchers, business leaders and individuals. Our work is based upon the latest science and research on early childhood development. Our mission is to raise awareness of the critical importance of fostering the cognitive, social and emotional development of young children by emphasizing its future impact on the economic prosperity of everyone in Massachusetts. We welcome the business, education, and policy-making communities, as well as members of the media to be part of this crucial venture. By giving a strong start to our youngest citizens, we create a stronger, more prosperous future for all.

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## The Science Behind Brain Building

When we understand the sequence and process by which brains are built, it's easy to understand why it's a smart investment to start every child out strong. Scientific research shows that early experiences directly shape how the brain develops. According to the Harvard University Center on the Developing Child, Stanford University and other leading researchers:

- In the first few years of life, 700 new neural connections are formed every second.
- Neural connections and the architecture of the developing brain are built through back-and-forth interactions with adults in enriching environments.
- Brain building is disrupted by “toxic stress,” a term that describes chronic stressful conditions rooted in causes such as poverty, neglect, or maternal depression. Toxic stress increases the likelihood of developmental delays.
- Several studies have shown that, as early as 18 months, there are notable disparities in vocabulary between children from language-rich, high interaction homes and those who are not. Recent Stanford research showed that by age two, this equals a six month gap in language processing skills and vocabulary. By increasing interaction, using richer language and child-directed talk, parents can help their child to learn more quickly.



Brain Building can happen anywhere, not just in a formal school or early education programs. Anyone can be a Brain Builder by reading with children, asking lots of open-ended questions or engaging them in play. For fun ideas about how you can turn any moment into a brain building moment, download our activity guides.

# The Nature of Early Childhood Science In the Outdoor Classroom



Children have wonderful imaginations and an innate desire to explore through direct experience. Like scientists, children are continuously gaining new knowledge about the world around them through observation, inquiry, and experimentation. Often they do this by asking questions, lots of them. These questions, flowing from experience and observation, are at the heart of early childhood science. Early childhood educators can guide this natural curiosity as well as model skills and attitudes for learning. Teachers, you will have questions too, as you explore the natural world together with your students. Share your questions with children—your willingness to “not know” is actually one of the easiest and most powerful ways that you can model what it means to “practice science” in the early years.

When exploring the natural world, science is all around you, but where do you start with a group of young learners? Sometimes it’s best to start with their curiosity and other times you may begin your explorations with activities and tools that help to focus attention and observation. Integrating science exploration in early education can both develop future scientific understanding as well as promote essential learning attitudes and confidence. It also provides a strong foundation for critical thinking and comfort with the practice of science.

Outside the classroom door, the natural world opens up the child’s innate sense of wonder. Here’s an example from a classic:

“That’s funny,” said Pooh (standing by a picket fence). “I dropped it on the other side,” said Pooh, “and it came out on this side! I wonder if it would do it again?” And he went back for some more fir cones.” It’s likely that you recognize this passage from A.A. Milne’s *House at Pooh Corner*. It embodies what is at the heart of practicing science in the early childhood classroom—that learners observe, question, experiment, ask questions, and inquire, through direct experience of the world around them.

Through these four units, you can jump start nature-based science learning and discovery by exploring your schoolyard or outdoor classroom and focusing on the things that capture attention in any setting—birds, soil, trees, and weather. We encourage you to experiment with methods and activities for using the natural world to create a culture of wonder and scientific thinking into your early childhood education setting.





## Ten Tips for Taking Preschoolers Outdoors

1. Start with free play. Playing outdoors, exploring textures and colors, running and jumping, designing and building are all learning activities in themselves.
2. Continue with short focused trips outside. A ten-minute walk can yield lots of observations. If possible, ask additional adults to come along for outdoor activities.
3. Be safe. Preview the space to be explored whenever possible. Point out dangers such as broken glass or thorny plants. Make sure everyone has appropriate clothing for the weather, and think about a plan in case of emergency.
4. Encourage respect for nature. Tell children that they need to respect plants and animals just like they respect one another. Be a good role model by being gentle with leaves and insects. Before you go out, talk about whether it is okay to pick flowers or collect worms.
5. Focus on one question or phenomenon, such as, “Can you find anything green outside?” or “What sounds do you hear?” Make sure students know what they are looking and listening for before they go outside.
6. Look for things to study in unlikely places. Students can find amazing things looking at brick walls rock outcrops, lawns, broken pavement, and weeds.
7. Encourage a sense of wonder. If you don’t know the names of plants or birds, don’t worry. Just make sure students are observing and using their senses. There are plenty of field guides available if students want to try to identify something.
8. Visit the same spot multiple times over the course of the year. Even in winter, there can be interesting rocks, twigs, birds, and signs of animals to observe.
9. Draw and write. When students record observations, they are more focused and have more to think and talk about when you get back inside.
10. Be flexible. You never know what you might see. If the lesson is about clouds, but a cluster of ladybugs captures children’s attention, be ready to change your plans.



# OUR FEATHERED FRIENDS

## STEM Preschool Teaching Unit



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**Y**oung children are naturally curious about birds, and all animals, and are delighted when they can observe birds up close. This unit offers several activities for observing birds and learning about birds, their habitats, their foods, and their behaviors. The investigations include:

1. What do you know about birds?
2. What are feathers? How do they help birds?
3. How are beaks useful to birds? Why are they different?
4. What sounds do birds make? Are they all the same?
5. What are nests? How are they made? How do they help birds?
6. How do birds survive?
7. What is migration? Why do birds migrate? Do all birds migrate?

This unit is ideally taught with the involvement of a parent volunteer or other person who is already a bird watcher or nature enthusiast.

# WHY TEACH ABOUT BIRDS?



**B**irds have always inspired us by their songs, their ability to fly, their seemingly infinite variety of shapes, sizes, and coloration, their many remarkable adaptations, and their always fascinating and sometimes bizarre courtship rituals. By observing and learning about birds outside the classroom and in the local community, students can gain a greater understanding about the lives of birds everywhere and the entire animal kingdom, in general.

Birds are commonly found in all settings, in every community. The birds you can observe from inside your preschool classroom, in the schoolyard, and in the community, will vary with the weather and the seasons. What will be consistent, will be the excitement, interest, and enthusiasm of the students when they are encouraged to learn about and observe the birds that can be found in your community.

When a young child learns about birds, he/she is learning about the entire world of animals and nature. And when young children gain experience observing birds, they will also naturally learn about bird identification, bird behavior, habitats, and conservation.



**Investigation Objectives and Alignment to  
Massachusetts Department of Education Pre-K Science, Technology  
and Engineering Standards 2013  
for 2015-2016 implementation**

Investigation	Children will be able to:	PRE-K Learning Standards
<p><b>#1</b> <b>Introduction to birds:</b> <b>What do you know or want to know about birds?</b></p>	<ul style="list-style-type: none"> <li>• Describe that birds are living things because they need food, water, shelter, air to grow and reproduce.</li> <li>• Compare the life cycle of a bird to another animal</li> <li>• Name some characteristics of what makes a bird a bird.</li> </ul>	<p><b>PreK-LS2-1(MA).</b> Use evidence from animals and plants to define several characteristics of living things that distinguish them from non-living things.</p> <p><b>PreK-LSI-2(MA).</b> Recognize that all plants and animals grow and change over time.</p> <p><b>PreK-LSI-3(MA).</b> Explain that most animals have 5 senses they use to gather information about the world around them.</p> <p><b>PreK-LSI-1(MA).</b> Compare, using descriptions and drawings, the external body parts of animals (including humans) and plants and explain functions of some of the observable body parts.</p>
<p><b>#2:</b> <b>What are feathers?</b> <b>How do they help birds?</b></p>	<ul style="list-style-type: none"> <li>• Explain the role feathers play in a bird's survival.</li> </ul>	<p><b>PreK-LSI-1(MA).</b> Compare, using descriptions and drawings, the external body parts of animals (including humans) and plants and explain functions of some of the observable body parts.</p> <p><b>PreK-PS2-1(MA).</b> Using evidence, discuss ideas about what is making something move the way it does and how some movements can be controlled.</p>
<p><b>#3:</b> <b>How are beaks useful to birds?</b> <b>Why are they different?</b></p>	<ul style="list-style-type: none"> <li>• Understand the design of a bird's beak</li> <li>• Discuss adaptations of beaks for survival</li> </ul>	<p><b>PreK-LSI-1(MA).</b> Compare, using descriptions and drawings, the external body parts of animals (including humans) and plants and explain functions of some of the observable body parts.</p>
<p><b>#4:</b> <b>What sounds do birds make? Are they all the same?</b></p>	<ul style="list-style-type: none"> <li>• Compare sounds of common neighborhood birds, tone and length of song</li> <li>• Understand how sounds may differ for survival and safety of young</li> </ul>	<p><b>PreK-LSI-3(MA).</b> Explain that most animals have 5 senses they use to gather information about the world around them.</p> <p><b>PreK-LSI-4(MA).</b> Use their five senses in their exploration and play to gather information.</p>



<p><b>#5:</b>  <b>What are nests?</b>  <b>How are they made? How do they help birds?</b></p>	<ul style="list-style-type: none"> <li>• Design and build a model of a bird nest</li> <li>• List some of the different places where birds make nests and why</li> <li>• Compare and contrast the various materials that birds use for their nests</li> </ul>	<p><b>PreK-LSI-1 (MA).</b> Compare, using descriptions and drawings, the external body parts of animals (including humans) and plants and explain functions of some of the observable body parts.</p> <p><b>PreK-LSI-4(MA).</b> Use their five senses in their exploration and play to gather information</p> <p><b>PreK-LS2-2(MA).</b> Using evidence from the local environment explain how familiar plants and animals meet their needs where they live.</p> <p><b>PreK-PSI-3(MA).</b> Differentiate between the properties of an object and those of the material of which it is made.</p>
<p><b>#6:</b>  <b>How do birds survive?</b></p>	<ul style="list-style-type: none"> <li>• Name habitats of birds in their neighborhood.</li> <li>• Name foods found in those habitats</li> <li>• Explain an adaptation that helps a bird survive</li> </ul>	<p><b>PreK-LSI-1 (MA).</b> Compare, using descriptions and drawings, the external body parts of animals (including humans) and plants and explain functions of some of the observable body parts.</p> <p><b>PreK-LS2-2(MA).</b> Using evidence from the local environment explain how familiar plants and animals meet their needs where they live.</p>
<p><b>#7:</b>  <b>What is migration? Why do birds migrate? Do all birds migrate?</b></p>	<p>Discuss the basic concept of migration and why it is necessary for some birds</p>	<p><b>PreK-LS2-2(MA).</b> Using evidence from the local environment explain how familiar plants and animals meet their needs where they live.</p> <p><b>PreK-LS2-3(MA).</b> Give examples from the local environment of how animals and plants are dependent on one another to meet their basic needs.</p>



## Suggested outdoor exploration materials

- Images of birds, nests, and foods that birds eat
- Feathers (from a crafts store)
- Bird shapes cut from cardboard
- Toilet paper tubes
- String or yarn
- Coffee filters
- Household objects that imitate birds beaks (see investigation #3)
- Bird seed
- Materials for constructing bird nests (see investigation #5)
- Hand lenses
- Popsicle sticks
- Clipboards (can attach pencils with string or velcro)
- Trowels (small shovels)
- Penlight or other small flashlight
- Small plastic containers to hold living things
- White plastic plates to observe samples
- Ziploc bags, various sizes
- Plastic terrariums
- Spray bottles
- Measuring tapes or string
- Field guides to birds (Pocket Naturalist laminated guides are great)
- Disposable or digital camera
- Crayons and markers (fine and thick point)
- Paints
- Clay or play dough
- Collage materials
- Bendable wire or pipe cleaners
- Posters about birds

## Keep it easy!

- Assemble outdoor kits in backpacks to pick up and go as you walk outdoors!
- Families will gladly save and send in recyclable that are both reusable and disposable. Just ask!



# OUR FEATHERED FRIENDS

## Basic Concepts and Fun Facts



### What makes a bird a bird?

#### Is it the pretty colors?

No—other animals, like fish and insects, come in all sorts of beautiful colors too.

#### Is it the bill or beak?

No—other animals, like turtles have beaks.

#### Is it the eggs?

No—other animals, like fish, amphibians, reptiles, insects and even some mammals, hatch from eggs

#### Is it the wings?

No—other animals, like insects and some mammals, have wings.

#### What is it?

Feathers! All birds have feathers and birds are the only animals that do!

### Characteristics of a Bird

#### A bird:

- has a backbone
- is warm-blooded
- has two feet
- has feathers
- has two wings
- has a beak or bill without any teeth
- lays a egg with a hard shell
- has a high metabolic rate

### How do birds fly?

- Most birds that fly have hollow bones that are very light and strong.
- Flight feathers are perfectly aerodynamic – lightweight, strong, smooth, flexible.
- Strong breast muscles give them power to flap their wings and push themselves through the air.
- Their wings are airfoils (like an airplane wing) that produce lift when they flap them.
- Their respiratory and circulatory systems are very efficient so they have plenty of oxygen and energy for their flight muscles.
- They have a higher body temperature than mammals which allows their muscles to work faster and recover more quickly.



**While all birds share a broad set of traits they have many unique physical and behavioral adaptations that allow them to live in a variety of environments.**

### **Bird Feet**

Some birds can walk, some birds can hop, and some can do both, but all birds have feet. Almost all birds have 4 toes arranged with 3 in front and 1 in back. However, bird feet are highly adapted to where they live and what they eat.

- Raptors (birds of prey) have very sharp, hook-like claws that are used to catch prey. (Red-tailed Hawk)
- Birds that perch in trees have long toes and curved claws to help them balance on a branch or other perch. (Black-capped Chickadee)
- Birds that wade through water have very long toes that spread out to keep them from sinking in the mud. (Great Blue Heron)
- Birds that climb trees have 2 toes in front the front and 2 in the back. (Downy Woodpecker)
- Birds that swim have webbed toes. (Mallard Duck)
- Birds that walk on the ground and scratch for food have short blunt claws. (Wild Turkey)

### **Bird Beaks**

All birds have a beak or bill but they don't have any teeth. The shape of a bird's beak is suited to the type of food it eats.

- A multipurpose bird bill is relatively short with a blunt point. It's good for a small seeds, berries, and insects. (Black-capped Chickadee)
- Raptors have strong hooked beaks for tearing flesh. (Red-tailed Hawk)
- Seed eating birds have short, thick, cone-shaped beaks for cracking nuts and seeds. (Northern Cardinal)
- Birds that stalk and strike at their prey have long, straight, broad beaks for stabbing and grabbing. (Great-Blue Heron)
- Hummingbirds have long tubular beaks to reach into the bottom of a flower and drink nectar. (Ruby-throated Hummingbird)
- Insect eating birds have slender tweezer-like beaks that let them pick small insects from leaves or flowers. (Yellow Warbler)

- Birds that catch insects out of the air also have small beaks, but they have large mouths. (Tree Swallow)
- Birds that live in water and eat algae and aquatic insects have flat, broad, rounded beaks that they use to strain food from the water. (Mallard Duck)

### **Feathers**

Feathers are a complex body covering unique to birds and can be very different depending on their function.

- Down feathers for insulation have no central shaft and are soft and fluffy. These are the first layer of feathers on a bird's body.
- Contour feathers cover the bird's body and tops of the wings. They do have a central shaft, but the vanes on either side of the shaft are still fairly soft and able to conform to the curves of the body or wing.
- Flight and tail feathers have a strong central shaft and the vanes are very firm. They are stiff enough to hold their shape as the bird moves through the air.
- Most birds molt and grow a new set of feathers every year. Feathers molt symmetrically so you might notice a flying bird with a missing feather on both wings.
- Feather patterns and colors create camouflage or special coloration. Some birds grow a new set of feathers every spring for a breeding plumage that attracts mates.
- Although very light, a bird's feathers usually weigh 2-3 times as much as its skeleton.

### **Bird Wings and Flight**

- Where and how a bird flies is reflected in the shape and size of its wings.
- The most common wing shape is relatively short and rounded. This type of wing allows the bird to take off quickly, but is not very fast or good for gliding. (Found on most songbirds and ground dwelling birds)
- Raptors that soar have broad, long wings that allow them to ride on rising air currents. (Found on eagles, vultures, hawks)
- Birds that fly very fast or migrate long distances have long, slender, pointed wings. (Found on shorebirds, falcons, swallows, hummingbirds)



- Birds that spend their lives soaring low over the ocean have extremely long, narrow wings. (Found on albatross, shearwaters, jaegers)

### Bird Vision

Birds have the best vision among all vertebrate animals and it is their most important sense. They also have the largest eyes for their size. Most birds cannot move their eyes.

- Birds that hunt for prey have both eyes facing forward which gives them the depth perception necessary to catch prey. Most birds of prey can also turn their heads far enough to look directly behind themselves.
- Birds have three eyelids. Birds use the transparent third eyelid to blink with and some species use it to protect their eyes while flying or diving underwater. Birds only use their outer eyelids when they close their eyes.

### Bird Songs and Sounds

Birds communicate by making a variety of sounds and songs. They warn each other, declare their territories, give information about food, and attract a mate by the songs or calls they use.

- There are two basic categories of sounds. Longer, more elaborate songs attract mates and declare territories while briefer calls are used to identify each other and convey information about food or predators.
- Some birds imitate or mimic the songs of other birds or human sounds such as alarms or whistles. (Northern Mockingbird)
- Woodpeckers have songs and calls, but they also communicate by rapping or drilling on trees or other surfaces. (Downy Woodpecker)

### FUN FACTS:

- There are around 10,000 different species of birds worldwide.
- At nearly 9 feet, the ostrich is the largest bird in the world. It also lays the largest eggs and has the fastest maximum running speed (60 mph.)
- Hummingbirds are the smallest birds in the world. They can be as small as the Bee Hummingbird, 2 inches long. Hummingbirds can fly backwards.
- The chicken is the most common species of bird found in the world.
- A birds' weight is about 95% muscle and 5% bones.

**Bee Hummingbird shown at actual size!**



# PRESCHOOL INTEREST AREAS PLANNING FORM

## THEME: FEATHERED FRIENDS

(#1-7 indicates the investigation to go to for detailed instructions)

<p><b>ART</b></p> <ul style="list-style-type: none"> <li>• Paint with feathers (#2)</li> <li>• Bird footprints (#1)</li> <li>• Nest building (#5)</li> <li>• Toilet paper roll binoculars (#1)</li> <li>• Coffee filter birds (#2)</li> <li>• Bird seed collage (#3)</li> </ul>	<p><b>COOKING</b></p> <ul style="list-style-type: none"> <li>• Bird shape cookies (#1)</li> <li>• Eat like birds – fruit and seed buffet (#3)</li> <li>• Edible bird nests (#3)</li> <li>• Bird feeders (#6)</li> <li>• Fruity Nests to Nibble (#5)</li> <li>• Homemade suet (recipes)</li> </ul>	<p><b>DISCOVERY/SCIENCE</b></p> <ul style="list-style-type: none"> <li>• Bird feathers</li> <li>• Bird seed/nests</li> <li>• Hand lenses</li> <li>• Pictures of common birds in your area</li> <li>• Sequencing cards-life cycle (#5)</li> <li>• Bird Beak investigation (#3)</li> </ul>	<p><b>DRAMATIC PLAY</b></p> <ul style="list-style-type: none"> <li>• Bird puppets</li> <li>• Act like: hawks, robins hopping and pulling up worms, woodpeckers pecking bark for insects, etc.</li> <li>• Build nests in different areas of the room</li> <li>• Imagine hatching: Guided Imagery (#5)</li> </ul>
<p><b>ENGINEERING/DESIGN</b></p> <ul style="list-style-type: none"> <li>• Build bird houses or nests using various materials or blocks</li> <li>• Design bird shapes (can be one dimensional/flat on ground)</li> <li>• Create bird habitats around room (to provide food, water, shelter, space)</li> </ul>	<p><b>LITERACY</b></p> <ul style="list-style-type: none"> <li>• See attached annotated bibliography for multiple selections</li> <li>• Use your local library as a resource</li> </ul>	<p><b>MATH NUMERACY</b></p> <ul style="list-style-type: none"> <li>• Measure length of assorted feathers using different lengths of string/yarn</li> <li>• Sort feathers by size, pattern or color</li> <li>• Use a balance scale to compare weight of feathers to other objects.</li> <li>• Egg carton/bird seed count (#6)</li> <li>• Read <i>This Tree Counts</i> (see bibliography).</li> <li>• Seed Math (#6)</li> <li>• Measure wingspans (#2)</li> </ul>	<p><b>MUSIC/MOVEMENT</b></p> <ul style="list-style-type: none"> <li>• Tie colorful scarves to children's wrists to move like birds while listening to music – Bird song CD</li> <li>• Balance like a heron (one foot)</li> <li>• Flap arms (wings) to imitate different birds</li> <li>• Bird Olympics (#7)</li> <li>• Bird calls (#4)</li> <li>• Seed shakers (#4)</li> </ul>
<p><b>OUTDOORS</b></p> <ul style="list-style-type: none"> <li>• Use toilet paper roll binoculars to practice observing birds (#1)</li> <li>• Imitate bird sounds you hear (#4)</li> <li>• Neighborhood bird walk</li> <li>• Fly like a bird relay races</li> <li>• Make bird habitats around room</li> </ul>	<p><b>SENSORY</b></p> <ul style="list-style-type: none"> <li>• Trace/make bird shapes or tracks</li> <li>• Make bird nests with sand, water, twigs</li> </ul>	<p><b>GAMES/MANIPULATIVES</b></p> <ul style="list-style-type: none"> <li>• Bird puzzles</li> <li>• Bird stuffed animals</li> <li>• Bird Bingo (#1)</li> <li>• Bird memory game (#1)</li> <li>• Egg matching game (#5)</li> <li>• Migration Game (#7)</li> <li>• Owl and Mouse Game (#4)</li> <li>• Egg and Spoon race (#5)</li> </ul>	<p><b>COMMUNITY CONNECTIONS</b></p> <ul style="list-style-type: none"> <li>• Encourage families to visit parks or natural spaces in your area to observe birds.</li> <li>• Invite a naturalist/local birder to visit</li> <li>• Families may contribute cardboard toilet paper rolls, birdseed, etc.</li> <li>• Include photos of student observations and activities in a newsletter to be shared with families.</li> </ul>



# INVESTIGATION SUMMARIES

## THEME: FEATHERED FRIENDS

See *full Investigation lessons for specific “how-to” details.*

Big Ideas	Investigation #1 What do you know or want to know about birds?	Investigation #2 What are feathers? How do they help birds?	Investigation #3 How are beaks useful to birds? Why are they different?	Investigation #4 What sounds do birds make? Are they all the same?
<b>LARGE GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>KWL chart – teacher listens and scribes – guiding discussion if needed.</li> <li>Include feathers, nests and beaks</li> <li>Sing “Little Bird, Little Bird” or another song/fingerplay (see resources)</li> <li>Read selected story (see bibliography)</li> </ul>	<ul style="list-style-type: none"> <li>Provide feathers for each child to examine.</li> <li>Discuss importance of feathers and wings. See lesson detail.</li> <li>Read selection</li> <li>(see bibliography)</li> </ul>	<ul style="list-style-type: none"> <li>Display photos of many kinds of bird beaks</li> <li>Why are they so different, how do birds use them?</li> <li>Read-aloud (see bibliography)</li> </ul>	<ul style="list-style-type: none"> <li>Act out birds finding each other by sound.</li> <li>Song or Fingerplay (see resources)</li> <li>Read: <i>Where’s the Party?</i> or other selection (see bibliography)</li> <li>Bird calls – children imitate common birds</li> </ul>
<b>SMALL GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>Bird Bingo (Resources)</li> <li>Finger painting</li> <li>Matching games</li> <li>Field guides (Bibliography)</li> <li>Post a pictograph at window to tally what birds show up at feeders</li> </ul>	<ul style="list-style-type: none"> <li>Examine feathers with hand lenses.</li> <li>Experiment with them using air and water</li> <li>Children measure each other’s arm lengths to determine wingspan and make wings</li> </ul>	<ul style="list-style-type: none"> <li>Bird Beak investigation: children explore many kinds of beaks to see how well different utensils work to “eat” different foods</li> <li>Bird seed collages</li> </ul>	<ul style="list-style-type: none"> <li>Listen to CDs for bird songs, especially those children might hear in their neighborhood. Teacher matches sound to picture for clarification.</li> <li>Children make bean/seed shakers for sound discrimination</li> </ul>
<b>OUTDOOR LEARNING</b>	<ul style="list-style-type: none"> <li>Bird Walk: How many kinds of birds can we find? Keep track for a count.</li> <li>Hang feeders (details in #6)</li> </ul>	<ul style="list-style-type: none"> <li>Bird Walk: Look for birds and signs of birds (feathers, nests, tracks, droppings)</li> <li>Listen for birds</li> <li>Imitate birds</li> </ul>	<ul style="list-style-type: none"> <li>Return to places where we scattered seeds. Have birds been here? What are the signs?</li> <li>Children act out being birds looking for food.</li> </ul>	<ul style="list-style-type: none"> <li>Owl and Mouse game: discover how the owl uses sound to find food</li> <li>Bird walk to imitate and distinguish bird sounds</li> </ul>



# INVESTIGATION SUMMARIES

BIG IDEAS	Investigation #5 What are nests? How do they help birds? How are they made?	Investigation #6 How do birds survive?	Investigation #7 What is migration? Why do birds migrate? Do all birds migrate?
<b>LARGE GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• Discussion: Ask what children know about nests and why birds need them.</li> <li>• Show images of sizes, types of nests and locations.</li> <li>• Children suggest materials birds might use to make a nest</li> <li>• Choose song or fingerplay (See resources)</li> <li>• Imagine hatching: (See resources)</li> <li>• Vocabulary: brooding, clutch and egg tooth</li> </ul>	<ul style="list-style-type: none"> <li>• What do people need to survive?</li> <li>• Discuss a habitat and what it provides</li> <li>• Have children give examples of a bird habitat.</li> <li>• Discuss roll of talons on birds of prey</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss migration and why birds need to leave our neighborhoods.</li> <li>• Display a world map for a visual discussion</li> <li>• Read <i>Flutes Journey or No Two Alike</i> (see bibliography)</li> </ul>
<b>SMALL GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• Practice building a nest with outdoor materials provided. Glue it together with mud, just like birds!</li> <li>• Egg matching game</li> <li>• Fun snack: Fruity Nests to Nibble (see recipes section)</li> </ul>	<ul style="list-style-type: none"> <li>• Easy bird feeders children can make.</li> <li>• Owl pellet investigations to discover what the owl ate.</li> <li>• Seed Math – measuring with spoons and cups</li> <li>• Make suet (see recipes section)</li> </ul>	<ul style="list-style-type: none"> <li>• Allow children to use maps to string lines from Massachusetts to migration areas.</li> <li>• Take a walk outside to find natural food the birds might eat.</li> </ul>
<b>OUTDOOR LEARNING</b>	<ul style="list-style-type: none"> <li>• Practice building a nest outdoors.</li> <li>• Egg and spoon relay race</li> <li>• Class design/build HUGE nest for group to sit on eggs and listen to a read-aloud.</li> </ul>	<ul style="list-style-type: none"> <li>• Bird Walk: Could a bird live here? Is this a habitat?</li> <li>• Visit a spot where you spread seed. What happened?</li> <li>• Hang variety of feeders made by children</li> </ul>	<ul style="list-style-type: none"> <li>• Watch for geese formations</li> <li>• Migration Game (see Resources)</li> <li>• Take a walk outside to find natural food the birds might eat.</li> </ul>



# INTRODUCTION TO BIRDS

**What do you know or want to know about birds?**

**What makes a bird a bird?**

## LARGE GROUP LEARNING ACTIVITIES

Teacher scribes on a K-W-L chart as **students orally describe their own background experiences**, knowledge or observation of birds, vocabulary, characteristics, etc. Students may need help by referring to pictures you provide from the internet or other source to get them started.

For example:

**Read a story** - suggested story *Birds* (annotated bibliography provided in resources section)

What do we <b>KNOW?</b>	What do we <b>WANT to know?</b>	What did we <b>LEARN?</b>
Birds can fly	How do birds fly?	Some birds migrate
Birds live in trees	How far can they go?	Some birds cannot fly
Birds have nests	Why do they fly south?	

**Provide colorful images to discuss what children notice birds have in common.**

(See “Take a Look Outside” poster in resources section and the many available on-line). Take note of their comments on the KWL chart. What did ALL the birds have? **FEATHERS!**

**Discuss that FEATHERS are the defining characteristic of a bird.** Provide feathers for children to examine closely. Large clean ones from a craft store will do. Provide one for each child. Ask them what they noticed? They may respond with answers relating to length, softness, color, color patterns, weight, etc.

In this introduction, **display an actual nest or photos of nests** in many sizes and made of many materials.

**Sing “Little Bird, Little Bird”** or other song/fingerplay (in Resources Section)

## SMALL GROUP LEARNING ACTIVITIES

### Bird Bingo Game

- Can be made (see sample in resources section)
- Children receive laminated Bingo cards with pictures of things birds need to survive (food, water, shelter, air) – three across and three down
- Cards (to fit squares on Bingo card) with same photos are cut and laminated
- Students take turns to match card to those on Bingo card
- Goal is to get three photos vertically, horizontally or diagonally



- Consider the development of the children playing as they may simply want to match their card with the template. The goal is to become familiar with various types of birds.
- Outdoors, this could also be used as a scavenger hunt

Using the media of your choice, basic shapes (circle, rectangle, square, oval, triangle) or just free-handed scribbles, **children draw/finger paint their own bird.**

**Matching/memory games** – use 2 sets of laminated photos of many species of birds

**Field guides** – have simple guides available for children (see bibliography in resources section for suggestions)

**Post a bar graph or pictograph** at a window with feeders outside. Children can tally what birds are seen. Over a week they can determine the frequency of feeder visitors.

**Bird footprints:** Teacher should make a demo bird foot, by twisting pipe cleaners together to show the children the expectation and then allow the children the freedom to create their own. After twisting a footprint, dip in paint and “walk” across the paper.

- Construction Paper
- Pipe cleaners
- Paint

**Toilet paper roll binoculars:** Children assemble imitation binoculars for use many times throughout the bird unit. Have them decorate the rolls with markers (a name is also helpful). Use tape to connect the two rolls together. Use the punch to make a hole on the outer side of the two rolls. Insert the yarn through each hole to form a strap for the binoculars.

- Toilet paper rolls – enough for every child to have two.
- Markers for decorating
- Tape
- Hole punch
- Yarn – as a binocular strap

### Bird shape cookies

- Use pre-made refrigerated dough

- Children roll out dough
- Cut out shapes using bird cookie cutters or use shape cutters (circle, square, triangle) to design their own
- Bake as directed

## OUTDOOR LEARNING ACTIVITIES

### Bird walks

**Students will track how many birds they see.**

**Can they count them?**

**How many colors do they notice?**

**How many can we hear but not see?**

**What do we need to do to watch them closely?** (Be quiet, watch and listen)

**Identify birds** using a picture scavenger hunt, circle what you see

**Hang bird feeders** Suggestions for child-made feeders are in Investigation #6 – How do birds survive?

- At the start of this unit, it is important to hang bird feeders that provide different types of seed for students to observe.
- Try to hang them close to trees, flowers or shrubs. That will attract more birds since they will feel safer and have places to hide between visits to the feeders.



# What are feathers? How do they help birds?

## LARGE GROUP LEARNING ACTIVITIES

**Provide feathers** (from a craft store) for each child to examine.

**Discuss what feathers do for a bird.** Have children give ideas. Photos may help guide their thinking.

- Feathers insulate from water and temperature (example: wrap child in down comforter)
- Feathers can be plucked to keep young warm,
- Feathers help control flight,
- Feathers help distinguish male and female (males typically have brighter and more vibrant coloring)
- Feathers help camouflage and protect birds (google birds and camouflage for good photos)

**Read selection** (see bibliography)

## SMALL GROUP LEARNING ACTIVITIES

**Examine feathers with hand lenses.**

**Observe colors, patterns, designs in feather.** Using several feathers, the teacher will describe one and the children will observe all and tell the teacher which one they are describing.

**Try to split them and comb them back using a pencil as a beak.**

**Children blow on feathers to keep them in the air.** Discuss results. Discuss what children notice (journal your notes).

**Have children squirt small amount of water on the feathers.** What happens? (feathers repel water).

**Talk about wingspan, from hummingbird up.** Measure the child's wingspan. Cut out paper to that measured length and children can make their own wings.

**Paint with feathers:** Allow children to manipulate feathers, to know them in different ways. In this activity, children will use them as a brush. It will help them understand the texture, weight and capacity of a feather. Allow them to be creative and play with color and feathers.

- Construction paper
- Feathers (craft store feathers will work)



- Paint: dip into small cup or jar and also try laying them flat in a disposable tray for different coverage

**Coffee filter birds:** Precut several bird shapes out of stiff paper/cardboard (see Resources). Children select a shape and place it on a coffee filter. Using a dropper, children add one drop of paint at a time on the filter surrounding the silhouette. The paint will spread and mix together. Remove the silhouette.

### **Coffee filters (white)**

#### **Bird shape cut from cardboard**

- Droppers
- Small pots of paint

## **OUTDOOR LEARNING ACTIVITIES**

### **Bird Walk:**

- Look for birds and signs of birds high and low (feathers, nests, tracks, droppings)
- Listen for bird sounds

### **Children use their arms to imitate birds**

soaring, flapping, turning and landing

**With wings children made (see above) play some music** as children fly around testing their new wings



# How are beaks useful to birds? Why are they different?

## LARGE GROUP LEARNING ACTIVITIES

**Display photos of many kinds of bird beaks.** Have children note differences in size, shape

**Google bird images for a variety of beaks** from swallows (short and pointed) to shorebirds (long and flat) to raptors (curved with a sharp tip).

**Have children hypothesize** why they are they so different and how birds use them?

**Eat like birds** – fruit and seed buffet

- Snack time could include pumpkin seeds, fruit, berries, etc.

## SMALL GROUP LEARNING ACTIVITIES

**Bird Beak investigation**-(in bibliography, *Small Wonders*, p. 104)

- Provide tweezers, tongs, straws, toothpicks, etc. to use as beaks
- Children try to pick up what a bird might eat using that beak
- Provide various types of “food” such as beans, seeds, rice, grapes floating in water, goldfish crackers in Jell-O, etc. to simulate food sources for different species of birds

**Birdseed collages** – copy large silhouettes of birds (see resources section) onto cardstock. Children fill in with glue and various types of seed.

**Sort and classify different types of seeds**

**Edible bird nests** (see resources/recipes)

## OUTDOOR LEARNING ACTIVITIES

**Have children lay seeds in patterns** of their choice in an outdoor area.

**Children predict what happened to the seeds.** The next day, return to places where seeds were scattered. Have birds been here? Anyone else? What are the signs?

**Children act out birds searching for food** using clothespins to find pipe cleaner worms



# What sounds do birds make? Are they all the same?

## LARGE GROUP LEARNING ACTIVITIES

**Have children act out how birds recognize each other by using sets of shakers.** Find the sound that closely matches yours (for shakers, see small group activity below).

**Sing a song or recite selected fingerplay** (see resources section)

**Suggested reading** (see bibliography):

- *Where's the Party?*
- *Have You Heard the Nesting Bird?*
- *Birdsongs*

**Bird Calls:** Ask the children if anybody knows how to sound like a bird. Let them try one by one. They should be able to do a chicken, a turkey, a song bird, a baby chick. Let them think of others. Let the children come up one at a time and make a bird call. Let the rest of the children try to guess what kind of bird they are.

## SMALL GROUP LEARNING ACTIVITIES

**Listen to CDs for bird songs**, especially those children might hear in their neighborhood. Teacher matches sound to picture for clarification (see resources)

**Children design their own sound shaker** by putting different amounts of beans and seeds in a small container (recycled plastic containers, baby food jars, etc.)

## OUTDOOR LEARNING ACTIVITIES

**Owl and Mouse game:** the blindfolded child listens carefully to discover which child is holding the squeaky toy. (a large brown bag is a good substitute for a blindfold as it lets light in, but child cannot see beyond a short range).

**On a bird walk, listen for bird sounds. Imitate them.** Are the birdsongs short, long, loud, or soft? Do birds squeak, squawk or squeal? Can you see the bird making the sound?



# What are nests? How are they made? How do they help birds?

## LARGE GROUP LEARNING ACTIVITIES

**Students will discover that nests are used for shelter, and protection for their babies.**

**Bird nests come in all shapes and sizes.** Today we're going to look at a few different types of nests and talk about whom they belong to, where they are built, what they're made of, and why.

**Why does a bird build a nest? What is the nest used for?** Nests are safe, warm homes for eggs and baby birds. Every bird makes a nest just like the one its parents made. How does it know how to build a nest? It just knows. They have a deep knowing called INSTINCT. By instinct, every bird knows exactly how to build the right kind of nest for its eggs.

**Let's flap our wings like a bird looking for a good spot to build a nest.** Birds build their nests in all kinds of different places. In tree, on the ground, inside tin cans, on top of cliffs, under bridges, even inside chimneys! Different birds make nests in different places.

**There are many kinds of bird nests.** Show images of sizes, types of nests and locations (search google images).

- Ducks and killdeer are examples of birds that construct their nests on the ground.
- Woodpeckers use natural holes or cavities in trees and other places to lay their eggs.
- Swifts and swallows: construct their nests on sides of rock cliffs. Their nests are holes in the mud.
- Eagles: build nests on top of the highest trees.
- Ospreys: build high nests, sometimes on tops of tall poles (like telephone poles).
- Hummingbirds build tiny nests. They are built by the female alone in trees (oaks, birches, pines), bushes, or other interesting places like loops of chain or wire.
- American Robin nests are made of straw, twigs, grass, and feathers, held together by mud, and usually located in a tall shrub or tree between 5-15 feet off the ground. Robins might take 5-7 days to build their first nest. Most raise



a second brood (clutch of eggs) during the breeding season, which can fledge just 5 weeks after the first! The second time a robin builds a nest it might take only 2-3 days

- Pine Warbler: Much smaller than nest than Robin or Wood Thrush, but similar materials. They prefer to build in pine trees, hence their name.
- Barn Swallow: Nest made mostly of twigs and small bits of mud. Built in open barns or stables, occasionally under bridges.
- Baltimore Oriole: Nest is a pouch that hangs from outer branches of leafy trees, sometimes up to 30 feet off the ground. Made of straw, grass, and other plant materials.
- Great Crested Flycatcher: Uses many different materials to make a messy nest. It uses grass, leaves, roots, feathers, and even snakeskin or cellophane. Its nest is built in tree cavities.

**Have students flap their wings like a bird looking for materials to build a nest.** Birds make nests out of many different materials. They use materials that are easy to find where they live. What do you think a bird might use in its nest to make a warm, safe home for its eggs? (Grass, straw, twigs, string, mud, pieces of plastic wrap, paper, etc)

**Children suggest materials used:** twigs, mud, moss, yarn, cloth, pine needles, hair, burlap, etc.

**Once a nest is built, the birds usually add something to act like a soft pillow on the bottom.** Why? It keeps the eggs from cracking and keeps the baby birds warm and cozy. What types of things do you think they use? (feathers, sawdust, wood chips, fine grass)

**Once the eggs are laid in the nest, the bird does one last thing to keep the eggs safe and warm.** Can you guess? She sits on them! This is called BROODING.

**Bird eggs come in different sizes or colors, but are usually have the same shape.** What shape is it? A group of eggs laid at one time is called a CLUTCH. Some birds might have 2 to 4 clutches each spring and summer. After 2-3 weeks, most eggs are ready to hatch. Does anybody know how the baby birds get out of the shell? They use an EGG TOOTH, which is a pointy piece at the end of their beaks. The egg tooth helps them break through the shell, and then it falls off within a week or two.

**Let's pretend we're baby birds trying to peck our way out of an egg with our egg tooth.**

- Curl up on the floor, covered by a towel, sheet, blanket, piece of cloth, etc.
- Hold your hand in front of your mouth to be the beak, and stick one finger out to be the egg tooth.
- Slowly "peck" against the covering, using only your egg tooth. How many pecks do you need to make a crack?
- Slowly stretch feet and wings, one at a time
- Continue to "peck" and stretch until hatched.

## SMALL GROUP LEARNING ACTIVITIES

**Practice building a nest** with materials provided using only your beak(may need a bowl or paper bag as a base structure). Glue it together with mud!

**Egg Matching Game:** Cut 10-12 egg shapes from white construction paper. Decorate eggs then cut them into halves varying the cut pattern (zig-zag, wavy, straight, etc.). Glue one half of a set into a folder. Have the children match the halves.

**Life cycle card game** (resources) – children tell story of life cycle while completing puzzle

**Fun snack** - Make Fruity Nests to Nibble (see resources/recipes)



## OUTDOOR LEARNING ACTIVITIES

**Nest building** - Children will gather outdoor materials then flatten and shape play dough on the paper plate as a base to hold nesting materials together. Secure one end of twigs in the play dough. Other nesting materials can be twisted, piled or connected to each other to form a nest (as imagined by the child).

- Paper plates
- Play dough
- Collection of twigs, sticks grass and other natural materials. If possible have the children collect items on a walk

**Children build a nest with natural materials** using only a tool representing a beak (tweezers, tongs, chop sticks, toothpicks, etc.). A bowl or sandwich bag with top folded down several times may be used a base structure. Glue it together with mud.

**Egg and spoon relay race:** use plastic or play dough eggs

**Larger than life nest:** Have children collect and make a HUGE nest out of natural materials found outdoors (leaves, twigs, branches, etc.) or materials you have brought outdoors (pillows, blankets, etc.) Children sit in the nest on their eggs while listening to a story (see bibliography).



# How do birds survive?

## LARGE GROUP LEARNING ACTIVITIES

**What do people need to survive** (food, water, adult care and shelter)?

**Discuss a habitat and what it provides** (food, water, shelter, air and space) for birds that live there.

**Have children give examples of a bird habitat.** Where have they seen birds (forests, meadows, backyards, rivers, schoolyards, etc.)? List responses.

**Talk about talons on birds of prey** and how these help these birds survive (demonstrate with pipe cleaners)

## SMALL GROUP LEARNING ACTIVITIES

**Bird Feeders:** children string Cheerios on a pipe cleaner, shape into a “J” and hang from a schoolyard tree.

**Bagel feeders: spread with Crisco or sun butter, dip in seed and hang.** Birds will eat it all, leaving nothing behind to clean up.

**Toilet Paper Roll bird feeders:** Spread a toilet paper core with peanut butter or lard. Children roll in bird seed. Pat it in place to stick. Slide onto a branch that is close to a window.

**Make suet for outside feeders** (see recipes in resource section)

**Put owl pellets (bones and feathers owls throw up) in a glass jar.** Provide magnifying glasses/hand lenses and let your children look at them close up. Can you tell what the owl ate? Call a local nature center for information or see bibliography for on-line sources.

**Seed Math:** Fill a couple of large tubs with wild birdseed. Provide the children with funnels, measuring cups, measuring spoons, bowls etc. Spend some time at the table talking with the children about measurements. “How many quarter cups will it take to fill up this cup?” “How many teaspoons are there in this quarter cup? Let’s count them.” Let them count and measure, pour & stir. Save the birdseed for feeders.

### Egg carton bird seed counting game

- Label the bottom of an egg carton with a numeral from 1-12
- Children will use their selected “beak” (tweezers, clothespin, chop stick, etc.) to put the correct number of seeds or beans in each section

## OUTDOOR LEARNING ACTIVITIES

**Bird Walk:** Could a bird live here? How about here? Is this a good habitat? Why or why not?

**Visit a spot where you spread seed.** What happened? What are the clues?

**Hang a variety of child-made bird feeders close to windows to observe daily.**



# What is migration?

## Why do birds migrate?

## Do all birds migrate?

### LARGE GROUP LEARNING ACTIVITIES

**Discuss migration and why some birds need to leave our neighborhoods.** Do all our birds leave? Why not? Think about their habitats? What do they need to survive? What is winter like in your neighborhood. What does that mean for the birds?

**How do birds stay warm in winter? How do we stay warm in winter?** We wear coats, hats, gloves, and boots. Birds can't do this, but they can turn their feathers into big puffy coats! They puff up their feathers and the air trapped inside heats up and keeps them warm! And though they don't have hats, gloves, or boots, birds can tuck parts of their bodies into their "puffy coat" to keep them warm. That's why you sometimes see a bird standing on one leg in the winter. It will tuck one leg in for a while, and then switch and tuck the other leg in. Let's stand up and try that to keep warm like a bird!

**Display a world map for a visual discussion of migration routes** (from Massachusetts to Florida, Mexico, South America, etc.)

**How fast do birds fly?** Speed ranges from 20 to 50 miles per hour. Larger birds fly faster than smaller birds. If the flock flies for 10 hours a day, then they could fly about 400 miles a day!!

**Navigation is complicated** because it requires three things: birds must know their current location, their destination and the direction they must take to get there. Most birds fly by night in small flocks. This allows them to eat during the day, and avoid some predators

**Some birds use the sun and the stars to navigate.** Some also use landmarks like rivers, mountains or coastlines. Some might use smell. Still others might follow the other birds in the flock.

**Read** *Flutes Journey* (see bibliography)

### SMALL GROUP LEARNING ACTIVITIES

**Allow children to use a map and yarn** to string lines from Massachusetts to where the birds may migrate.

**Bird Olympics:** Students challenge themselves to flap arms for ten seconds and compare flaps to that of different birds



## OUTDOOR LEARNING ACTIVITIES

**Watch for geese formations.** What shape are they?

**Migration Game:** Children learn about the distances birds and other animals travel to find food and shelter. Lay hula hoops in different locations. Children select a bird to represent and “fly” from place to place in order to get water, food and rest to continue their journey.

**Bird Olympics:** Students challenge themselves to flap arms for ten seconds and compare flaps to that of different birds

**Take a walk outside** to find natural food the birds might eat during migration in your area (berries, seeds, etc).





## Possible extensions for this unit:

- Have a live bird brought into your classroom by a local bird rehabilitator or bird educator  
[www.massaudubon.org](http://www.massaudubon.org)
- Go to a local wildlife sanctuary or wildlife rehabilitation center for a program with a naturalist or rehabilitator  
[www.massaudubon.org](http://www.massaudubon.org)
- Take a field trip or invite a birder or naturalist to lead an outdoor program in your schoolyard or neighborhood [www.massaudubon.org](http://www.massaudubon.org)
- Maintain the bird feeding station at your preschool beyond the unit to observe the birds that visit in each season
- Create a bird habitat in your schoolyard or community
- Put nesting materials in your schoolyard and see if birds use them for nests – try yarn, string, drier lint, etc.



**CHILDREN’S BIBLIOGRAPHY**

<b>Title</b>	<b>Author</b>	<b>Description</b>
<i>A Nest full of Eggs</i>	Priscilla Jenkins	This first look at robins follows a full year of growth and change.
<i>About Birds: A Guide for Children</i>	Cathryn Sill	This child-friendly book offers a first thoughtful glimpse into the world of birds: from eggs to nests, from song to flight.
<i>An Egg is Quiet</i>	Dianna Aston	An exceptionally handsome book on eggs, from the delicate ova of the green lacewing to the rosy roe of the Atlantic salmon to the mammoth bulk of an ostrich egg.
<i>Are You My Mother?</i>	P. D. Eastman	A baby bird goes in search of his mother in this hilarious Beginner Book edited by Dr. Seuss.
<i>Backyard Birding for Kids</i>	Fran Lee	This field guide will help you identify all kinds of birds because no matter where you go, you’re bound to spot a bird!
<i>Bear and Bird</i>	James Skofield	One spring evening an old bear finds a young bird, still learning to fly, has fallen to the ground. When the bear lifts the bird to safety, a friendship begins.
<i>Birds</i>	Anna Pomaska	Hours of educational fun in a coloring book featuring 30 different birds and large, simply drawn illustrations .
<i>Birds</i>	Kevin Henkes	Birds come in all sizes, shapes, and colors. Birds are magic. Birds are everywhere.
<i>Birds (My First Discovery Series)</i>	Rene Mettler	Young children can see the skeleton beneath the feathers of a bird, discover a nest of eggs hidden in a tree, and watch a ptarmigan change colors with the changing seasons.
<i>Birdsongs: A Backwards Counting Book</i>	Betsy Franco	Celebrate neighborhood birds in this poetic picture book, and count their sounds backward from ten to one.
<i>Birds Build Nests</i>	Yvonne Winer	Full-page, detailed, realistic watercolors, each showing a particular species of bird in its natural habitat, are the real highlight of this very simple, poetically written introduction to birds.
<i>Bird Nests</i>	Helen Frost	Describes the nests of various types of birds and the materials used to build them,.
<i>Bird, Nests and Eggs</i>	Mel Boring	A fun, informative take-along guide that will help children identify 15 birds and learn how and where birds build their homes and all about their young.
<i>Chicks and Salsa</i>	Aaron Reynolds	What happens at Nuthatcher Farm when the chickens get tired of the same old chicken feed?
<i>Counting Is For The Birds</i>	Frank Mazzola	Count up to twenty colorful backyard birds as they gather to crack seeds at the feeder while a cunning cat lurks below!



<b>Cock a Duddle Whooo</b>	Mick Manning	One stormy night, a lost and lonely owl walks into a farmyard looking for a place to sleep.
<b>Don't Let the Pigeon Drive the Bus</b>	Mo Willems	When a bus driver takes a break from his route, a very unlikely volunteer springs up to take his place...a pigeon!
<b>Duck on a Bike</b>	David Shannon	When Duck gets the zany idea to ride a bike one day, each animal on the farm has a reaction.
<b>Feathers for Lunch</b>	Lois Ehlert	An escaped house cat encounters twelve common birds in the backyard but only captures feathers for lunch.
<b>Flute's Journey</b>	Lynne Cherry	This is a story of a wood thrush's first year and his arduous first migration--across thousands of miles.
<b>George Flies South</b>	Simon James	A little bird waiting in his nest for his mother to bring back food is blown into the sky, nest and all, by a great wind. Will he be able to fly?
<b>Have You Heard the Nesting Bird?</b>	Rita Gray	Woodpecker calls from a tree, "cuk-cuk-cuk." Starling sings, "whistle-ee-wee." But have you heard the nesting bird?
<b>Loon Baby</b>	Molly Griffin	When Mama Loon dives for the baby's dinner and disappears, baby loon worries because she has never been gone so long.
<b>Mama Built a Little Nest</b>	Jennifer Ward	There are so many different kinds of birds and those birds build so many kinds of nests to keep their babies cozy.
<b>No Two Alike</b>	Keith Baker	Follow a pair of birds on a snowflake-filled journey through a gorgeous winter landscape to explore how everything, everywhere is wonderfully unique--from branches and leaves to forests and trees to friends and loved ones.
<b>Owl Babies</b>	Martin Waddell	When three baby owls awake one night to find their mother gone, they can't help but wonder where she is.
<b>Owl Moon</b>	Jane Yolen	As expansive as the broad sweep of the great owl's wings and as close and comforting as a small hand held on a wintry night .
<b>Quiet</b>	Peter Parnall	A young boy goes into a field and lies down on his back, perfectly still, perfectly quiet, with a pile of seeds and apple cores placed on his chest.
<b>Snowballs</b>	Lois Ehlert	Pull on your mittens and head outside for a snowball day. Grab some snow and start rolling. With a few found objects--like buttons and fabric and seeds--and a little imagination, you can create a whole family out of snow.
<b>The Bird House</b>	Cynthia Rylant	Cheerless and homeless, a girl is ambling along a river when she sees a bright blue house thronged by birds.
<b>Where's the Party?</b>	Katharine Crosby Robey	From the time Kate wakes up, birds seem to be singing messages to her. A robin sings, "News!" A cardinal whistles, "Par-ty!" Of course Kate wants to go, but where?



## TEACHER'S BIBLIOGRAPHY/RESOURCES

Title	Author	Description
<i>Discovering Nature with Young Children</i>	Chalufour and Worth	This explores the wide-ranging elements that make up the natural world around us. The curriculum replaces simple fact-feeding practices with the development of long-term scientific reasoning.
<i>Hands-on Nature</i>	Jenepher Lingelbach	Grouped around five themes (Adaptations, Habitats, Cycles, Designs of Nature, and Earth and Sky), fact-filled essays introduce each subject, followed by field-tested, experiential activities that engage students in learning about the natural world.
<i>Hug A Tree and Other Things to Do Outdoors With Young Children</i>	R. Rockwell, E. Sherwood, and R. Williams	Make a rainbow, take a bird to lunch, or measure the wind. Parents and teachers will be able to guide children on a magical discovery tour of the outdoors.
<i>Ibird app - Smartphone</i>	<a href="http://ibird.com/">http://ibird.com/</a>	Bird songs, photos and descriptions
<i>Identifyer</i>	Amazon-\$34.95	Identify bird songs at the touch of a button
<i>Nature's Playground</i>	Fiona Danks	Children will learn how to build a den from branches, make twig boats to sail across a pond, and voyage through the backyard to find tiny insects and creatures.
<i>Mudpies to Magnets: A Preschool Science Curriculum</i>	Williams, Rockwell, and Sherwood	224 hands-on science experiments and ideas with step-by-step instructions delight and amaze children as they experience nature, the human body, electricity, floating and sinking, and more.
<i>More Mudpies to Magnets: A Preschool Science Curriculum</i>	Williams, Rockwell, and Sherwood	Develop the natural scientist in every child with 260 hands-on science activities and ideas.
<i>Owl Pellet Sources</i>	pellet.com, carolina.com, teachersource.com	Order individual pellets to full kits
<i>Small Wonders: Nature Education for Young Children</i>	Linda Garrett, Hannah Thomas	Introduces children ages three through kindergarten to the natural world in a special hands-on way.
<i>Stokes Beginner's Guide to Birds: Eastern Region</i>	Stokes, Donald and Stokes, Lillian	This pocket-size, brilliantly colorful, simple-to-use guide contains dozens of full-color photographs that enable readers of all ages to identify the most common species.
<i>Stokes Field Guide to Bird Feeding</i>	Stokes, Donald and Stokes, Lillian	This large format paperback book contains the essential information that backyard nature enthusiasts want and need to select feeders and understand the basics of bird feeding.
<i>Ten Minute Field Trips</i>	H. Russell Ross	For all school environments - urban, suburban, or rural – the author describes more than 200 short, close-to-home field trips that explore new dimensions of familiar spaces and objects.



# FINGERPLAYS

## Two Little Birds

Two little black birds, sitting on a hill  
One named Jack, one named Jill  
Fly away Jack, fly away Jill  
Come back Jack, come back Jill

(hands behind back)  
(bring pointer finger on one hand forward, then the other)  
(hide one hand behind back, then other hand)  
(bring pointer finger on one hand forward, then the other)

Two little blue birds, sitting on a hill  
One named Jack, one named Jill  
Fly away Jack, fly away Jill  
Come back Jack, come back Jill

(may substitute fingers for black, blue or red birds attached to a craft stick as a puppet)

Two little red birds, sitting on a hill  
One named Jack, one named Jill  
Fly away Jack, fly away Jill  
Come back Jack, come back Jill

## Robin Red Breast

Way up high, little robin flying just so  
Quick down low for a worm he must go  
With a wing on the left and a wing on the right,  
Fly to your tree for soon it will be night

(put hands up as high as possible)  
(put hands low, almost touching the floor)  
(extended arms one at a time)  
(flapping arms like flying)

## Five Little Birds

Five little birds in a nest in a tree  
Are just hungry as can be  
“Peep,” said baby bird number one  
Mother bird promised she would come  
“Peep, Peep,” said baby bird number two,  
If she doesn’t come what will we do?  
“Peep, Peep, Peep,” said baby bird number three,  
I hope she can find this tree.  
“Peep, Peep, Peep, Peep,” said baby bird number four,  
She never was so late before.  
“Peep, Peep, Peep, Peep, Peep,” said baby bird number five,  
When will our mother bird arrive?  
Well, here she comes to feed her family  
They’re all as happy as can be!

(hold up right hand)  
(wiggle one finger)  
  
  
  
  
  
  
  
  
  
  
(use left hand as mommy bird)

## Hummingbirds

Five humming birds flying in the air  
The first one landed in my hair  
The second and third were a pair.  
The fourth humming bird didn’t care.  
The fifth humming bird hummed everywhere

(Hold up five fingers)  
(Grab little finger)  
(Touch index finger and thumb together.)  
(Grab ring finger.)  
(Touch middle finger and hum loudly)



## Five and five eggs

Five and five eggs	(hold up hands)
That makes ten	
Sitting on top is mother hen	(fold one hand over the other)
Crackle, crackle, crackle	(clap hands three times)
What do I see	(fingers around eyes)
Ten fluffy chickens	
As yellow as can be	(hold up ten fingers)

## Wide Eye Owl

There's a wide eye owl	(make binoculars with hands on eyes)
With a pointed nose	(point to nose)
Two pointed ears	(grab ears)
And claws for toes	(wiggle fingers and point to toes)
He lives way up in the tree	(point up to the ceiling)
And when he looks at you	(point)
He flaps his wings	(flap arms like wings)
And says Who....Whooo!	(continue flapping)

## RECIPES

### No-cook Playdough

1 c. flour  
1/3 c. salt  
1/2 c. water  
Few drops vegetable oil or liquid soap  
Mix flour and salt. Slowly add water, then oil.  
Knead, store covered.

### Edible Bird Nests

- melt chocolate chips
- mix with chow mein noodles (shredded wheat or pretzels work as well)
- shape into nests
- add jelly beans for eggs

### Fruity Nests to Nibble: makes 6

Ingredients: mixing bowl, 2 large shredded wheat biscuits, measuring cups & spoons, 1/4 cup coconut, 1 Tbsp. brown sugar, 1/4 cup margarine or butter (melted), Muffin tin, Foil, Fruit or jelly beans

1. To make the nests, in a mixing bowl crumble shredded wheat biscuits with your fingers. Use a spoon to stir in coconut and sugar. With adult help, pour in the melted margarine. Stir everything together.
2. Line each of the 6 muffin cups with a piece of foil. Press the shredded wheat mixture onto the bottoms & up the sides of the foil-lined cups.
3. With adult help, bake in 350 oven about 10 minutes or till crisp. Cool the nests in the cups.
4. Remove the nests from cups by lifting up on the foil. Carefully peel the foil off nests.
5. Fill the nest with fruit or jelly beans. If desired, top the fruit with a spoonful of yogurt.



## SONGS

### **Little Bird, Little Bird** (Tune: Twinkle, Twinkle, Little Star)

Little bird, little bird, fly around,  
Up to the sky, down to the ground.  
Little bird, little bird, flap your wings.  
Open your beak, and sweetly sing.  
Little bird, little bird, fly to your nest.  
Now it is time to take a rest.

### **Feed the Birds** (Tune: Row, Row, Row Your Boat)

Feed, feed, feed the birds In the wintertime.  
When the days are dark and cold, food is hard to find.  
Feed, feed, feed the birds, till the spring has come.  
Scatter birdseed on the snow, feeding birds is fun!

### **Owl in the Tree** (Tune: Skip to my Lou) (Suggested for morning circle when doing Bird theme)

Owl in the tree says, who, who, who  
Owl in the tree says, who, who, who  
Owl in the tree says, who, who, who  
Who, who, are you? (point to a child and have them say their name)



# DIGGING INTO SOIL

## STEM Preschool Teaching Unit



Ages 2.9-5 years

[www.massaudubon.org/education](http://www.massaudubon.org/education)

**Y**oung children love dirt, mud, and everything in between! Preschoolers are naturally curious about soils and most young scientists are delighted when they have the opportunity to get dirty.

This unit offers six different investigations designed to help young scientists learn about soils:

1. Soil Sense – What is Soil?
2. Soil Science – What is soil made of? Where does it come from?
3. Under My Feet – Who and what lives in soil?
4. Wiggly Worms – What makes a worm a worm?
5. How do people use soil?
6. Construction Site – Engineering with soil



**W**hen preschoolers build sand sculptures, create mud pies, and soak the ground with a garden hose, they are learning about soils. These simple explorations of the interaction of soil, water, and air bring up wonderful conversations about how soil is made, how it behaves under different conditions, and the many ways that soil is part of our lives.

Please allow, and even encourage, your students to fully investigate soils. Staying clean should not be anyone's priority. Wearing an apron or an old shirt over their clothing may help some young scientists and their teachers feel more comfortable exploring in these investigations. On a warm day, the most enthusiastic young soil scientists can be cleaned up with a watering can or garden hose.

When a young child learns about soils, he/she is learning that soil is a vital part of our environment and of our daily lives. From the ground up, children learn about how plants, animals, and humans depend on the health of soil. So, dig in- it's time to get your hands dirty.



**Investigation Objectives and Alignment to  
Massachusetts Department of Education Pre-K Science, Technology  
and Engineering Standards 2013  
for 2015-2016 implementation**

Investigation	Children will be able to:	Pre-K STE Learning Standards
<p><b>#1</b> <b>Soil Sense:</b> <b>What is soil?</b></p>	<ul style="list-style-type: none"> <li>• Use their senses to compare and contrast a variety of different soils.</li> <li>• Sort and classify soil samples based on investigation, measuring, and sifting soil.</li> </ul>	<p><b>PreK-LS1-3.</b> Explain that most animals have 5 senses they use to gather information about the world around them.</p> <p><b>PreK-LS-1-4.</b> Use their five senses in their exploration and play to gather information.</p>
<p><b>#2</b> <b>Soil Science:</b> <b>What is soil made of?</b> <b>Where does it come from?</b></p>	<ul style="list-style-type: none"> <li>• Describe the living, non-living, and once-living components of soil.</li> <li>• Name different components of soil.</li> <li>• Discuss a variety of ways that soil is made.</li> <li>• List some of the effects of water on soil.</li> </ul>	<p><b>PreK-ESS2-2.</b> Observe and classify non-living materials, natural, and human made, in their local environment.</p> <p><b>PreK-ESS2-6.</b> Understand the impact of weather on living things.</p> <p><b>PreK-LS-1-4.</b> Use their five senses in their exploration and play to gather information.</p> <p><b>PreK-PS-1-4.</b> Recognize through investigations that physical objects and materials can change under different circumstances.</p>
<p><b>#3</b> <b>Under My Feet:</b> <b>Who and what lives in soil?</b></p>	<ul style="list-style-type: none"> <li>• Describe that soil is a habitat for many living things—both plants and animals.</li> <li>• Design and build a model of an underground habitat.</li> <li>• Collect data on soil invertebrates through observation and experimentation.</li> </ul>	<p><b>PreK-LS-1-4.</b> Use their five senses in their exploration and play to gather information.</p> <p><b>PreK-LS-2-2.</b> Using evidence from the local environment explain how familiar plants and animals meet their needs where they live.</p>



<p><b>#4</b> <b>Wiggly Worms:</b> <b>What makes a worm a worm?</b></p>	<ul style="list-style-type: none"> <li>• Discuss specialized adaptations of worms for living in the underground habitat.</li> <li>• Design and conduct investigations on how worms move.</li> </ul>	<p>PreK-LSI-1. Compare, using descriptions and drawings, the external body parts of animals and plants and explain functions of some of the observable body parts.</p> <p><b>PreK-LSI-3.</b> Explain that most animals have 5 senses they use to gather information about the world around them.</p> <p><b>PreK-LS-1-4.</b> Use their five senses in their exploration and play to gather information.</p>
<p><b>#5</b> <b>How do People Use Soil?</b></p>	<ul style="list-style-type: none"> <li>• Discuss how plants use the soil in order to grow.</li> <li>• Describe how we eat vegetables that grow above as well as IN the soil.</li> <li>• Design and create a small garden and monitor its growth over time.</li> <li>• Design, create, and monitor a classroom composter.</li> </ul>	<p><b>PreK-LS-1-2.</b> Recognize that all plants and animals grow and change over time.</p> <p><b>PreK-ESS3-2.</b> Observe and discuss the impact of people’s activities on the local environment.</p>
<p><b>#6:</b> <b>Construction Site:</b> <b>Engineering with Soil</b></p>	<ul style="list-style-type: none"> <li>• Describe and discuss the different uses of soil and mud by animals (including humans).</li> <li>• Design and build objects out of mud.</li> <li>• Discuss the properties of soil, mud, water and rocks through play, design, and exploration.</li> </ul>	<p><b>PreK-LS-1-4.</b> Use their five senses in their exploration and play to gather information.</p> <p><b>PreK-PSI-4.</b> Recognize through investigation that physical objects and materials can change under different circumstances.</p>



## Suggested outdoor exploration materials

- String or yarn
- Coffee filters
- Hand lenses
- Popsicle sticks
- Clipboards (can attach pencils with string or velcro)
- Trowels (small shovels)
- Penlight or other small flashlight
- Small plastic containers to hold living things
- White plastic plates to observe samples
- Ziploc bags, various sizes
- Plastic terrariums
- Spray bottles
- Measuring tapes or string
- Disposable or digital camera
- Crayons and markers (fine and thick point)
- Paints
- Clay or play dough
- Collage materials
- Bendable wire or pipe cleaners

## Keep it easy!

- Assemble outdoor kits in backpacks to pick up and go as you walk outdoors!
- Families will gladly save and send in recyclable that are both reusable and disposable. Just ask!



# DIGGING INTO SOIL

## Basic Concepts and Fun Facts



### What is soil?

Soil is the skin of the earth, capable of supporting plant life and vital to all life on earth. Soil is a mixture of minerals, organic matter, liquid, gases, and micro and macro-organisms. Soil is characterized by layers or horizons – humus, topsoil, subsoil, parent material, etc.

Soil has 4 important functions:

- Medium for plant growth
- Means of water storage, supply and purification
- Modifier of the atmosphere – absorb and release gases and dust; modify temperature
- Habitat for organisms that decompose and create a habitat for other organisms

Many people confuse the terms soil and dirt. Dirt is what gets on our clothes or under our fingernails. Consider dirt as soil that is out of place – tracked inside by shoes, for example. Also, dirt is soil that has lost the ability to support life – it is “dead.”

### How is soil made?

Soil is made from the weathering of parent material by wind and water and the biological action of lichens, mosses, and by the addition of organic material. As rocks are broken down into smaller rocks and gravel and/or sediments are deposited by runoff, organisms begin to colonize the accumulated mineral particles and organic matter accumulates. Over time the organic matter breaks down and becomes part of the underlying material and soil develops. Soil formation is an ongoing process dependent on a number of factors:

- Parent material – eroding bedrock, deposited glacial till, river sediments, etc
- Climate – temperature, amounts of water and wind, seasonality
- Topography – slope, directionality
- Biota – plants, animals, microorganisms, humans
- Time – process never stops

### What is soil made of?

Soil is made up of three main components – minerals from rocks, organic matter from the remains of plants and animals, and living organisms that reside in the soil. In addition, soil contains air and water in the spaces between the particles.

The proportion of components and the size of the mineral particles (soil texture) are what determine the ability of a soil type to retain nutrients and water. From large to small, soil particles are sand, silt or clay. Loam is a soil made up of equal amounts of sand and silt with a smaller amount of clay. Loam is the ideal soil for growing most agricultural plants.



## How do plants use soil?

Soil supports plant growth by providing:

1. **Anchorage:** root systems extend outward and/or downward through soil to stabilize the plant.
2. **Oxygen:** the spaces among soil particles contain air that provides oxygen to root cells.
3. **Water:** the spaces among soil particles contain water, which is absorbed by the roots and moves up into the rest of the plant.
4. **Temperature modification:** soil insulates the roots from drastic fluctuations in temperature as it maintains a more constant temperature than the air. In New England, this is especially important during winter.
5. **Nutrients:** soil supplies nutrients from both minerals and organic material

## Worms and Soil

A tablespoon of soil has billions organisms including bacteria, protozoa, fungi, nematodes, insects, crustaceans, arachnids, and earthworms that are all part of a healthy soil ecosystem. The vast majority of these organisms are beneficial to the soil and the plants that grow in it. The most well known and usually the most common by weight are earthworms.

Earthworms are invertebrates. They have circulatory, respiratory, digestive, reproductive and nervous systems. They have no eyes although they can sense light.

Earthworms tunnel through the soil eating decaying roots and leaves and other soil organisms such as nematodes, protozoa, fungi, etc. They help to aerate the soil and improve water holding capacity with their tunneling and they add nutrients to the soil with their castings.

Earthworms breathe through their skin and cannot survive if their skin gets too dry. They mostly stay underground to avoid being dried out by the sun. Worms come to the surface during rain storms because they can move about safely without drying out, not in order to avoid drowning.

### Did you know?

- It is not true that if you cut a worm in half each half will grow into a new worm.
- In order to avoid freezing during the winter, worms migrate deeper into the ground below the frost line. They also may migrate deeper in the summer to avoid drying out.
- The earthworms we have in New England are actually introduced from Europe as our native earthworms were eliminated by the glaciers. Even though earthworms didn't arrive here until European settlers came, they have spread very rapidly throughout the northeast and Midwest.



# PRESCHOOL INTEREST AREAS PLANNING FORM

**THEME: DIGGING IN THE DIRT**  
 (#1-6 indicates the investigation to go to for detailed instructions)

<p><b>ART</b></p> <ul style="list-style-type: none"> <li>• Painting with soil/mud/worms (#4,5,#)</li> <li>• Soil texture collage</li> <li>• Clay sculptures (#6)</li> <li>• Soil smudges (#1)</li> <li>• Mud sculptures (#6)</li> <li>• Worm sculptures (#4)</li> <li>• Cookie cutter gardens (#5)</li> </ul>	<p><b>COOKING</b></p> <ul style="list-style-type: none"> <li>• Mud pies</li> <li>• Edible dirt (#5)</li> <li>• Window sill garden herbs (#5)</li> <li>• Stone soup (#5)</li> <li>• Where does food grow (#5)</li> </ul>	<p><b>DISCOVERY/SCIENCE</b></p> <ul style="list-style-type: none"> <li>• Soil layers in a jar (#1,#2)</li> <li>• Erosion table (#2)</li> <li>• Soil sifting (#1)</li> <li>• Planting with different soils (#5)</li> <li>• Making soil and mud (sand, silt, clay, water) (#1,#2)</li> <li>• Worm study (#4)</li> <li>• Compost bottles (#5)</li> <li>• Worm farm (#4)</li> <li>• Ant farm (#3)</li> <li>• Bug museum (#3)</li> <li>• Bug lab (#3)</li> </ul>	<p><b>DRAMATIC PLAY</b></p> <ul style="list-style-type: none"> <li>• Forest/garden restaurant (#5)</li> <li>• Construction zone (#6)</li> <li>• Archeological dig</li> <li>• Underground soil community (#3)</li> <li>• Worm puppets (#4)</li> </ul>
<p><b>ENGINEERING / DESIGN</b></p> <ul style="list-style-type: none"> <li>• Making mud balls &amp; bricks (#1,#6)</li> <li>• Making mud “sculptures” (#6)</li> <li>• Mud structures with blocks (#6)</li> <li>• Excavators &amp; dirt moving tools (#6)</li> <li>• 3D model/cross section (#2,#3)</li> <li>• Design a bug (#3)</li> </ul>	<p><b>LITERACY</b></p> <ul style="list-style-type: none"> <li>• See attached annotated bibliography for multiple selections</li> <li>• Use your local library as a resource</li> </ul>	<p><b>MATH/NUMERACY</b></p> <ul style="list-style-type: none"> <li>• Measuring soil, etc (#1,#2)</li> <li>• Weighing soil (#1,#2)</li> <li>• Plant Olympics (#5)</li> <li>• Garden planning (#5)</li> <li>• Measuring worms (#4)</li> </ul>	<p><b>MUSIC/MOVEMENT</b></p> <ul style="list-style-type: none"> <li>• Rock Music (#2)</li> <li>• Seed Sprouting (#5)</li> <li>• Mud Sliding (creative movement – i.e. <i>One Duck Stuck</i>) (#2)</li> <li>• Wood Turtle stomp (#4)</li> <li>• Move like a worm (#3,#4)</li> </ul>
<p><b>OUTDOORS</b></p> <ul style="list-style-type: none"> <li>• Tracking in the mud (#5)</li> <li>• Looking for erosion (#2)</li> <li>• Compost (#5)</li> <li>• Soil creatures and homes (#3)</li> <li>• Finding earthworms (#4)</li> <li>• Decomposing logs (#2,#3)</li> <li>• Soil samples and layers (#1,#2)</li> <li>• Coverboards (#3)</li> <li>• Mud kitchen (#2,#6)</li> <li>• Pitfall traps (#3)</li> </ul>	<p><b>SENSORY</b></p> <ul style="list-style-type: none"> <li>• Soil samples (#1,#2)</li> <li>• Soil smells (#1)</li> <li>• Sand, silt, clay – soil textures (#1,#2)</li> <li>• Frozen mud balls (#6)</li> </ul>	<p><b>COMMUNITY CONNECTIONS</b></p> <ul style="list-style-type: none"> <li>• Stone Soup (#5)</li> <li>• Soil sample from home (#1)</li> <li>• Family lunch from school garden (#5)</li> <li>• Field trip to garden, farm, food pantry—connections between farm and food (#5)</li> </ul>	<p><b>GAMES/MANIPULATIVES</b></p> <ul style="list-style-type: none"> <li>• Soil in a can (#1)</li> <li>• Soil bug matching (#3)</li> <li>• X-ray goggles (#3)</li> </ul>



# INVESTIGATION SUMMARIES

**THEME: DIGGING INTO SOILS**

(#1-6 indicates the investigation to go to for detailed instructions)

Big Ideas	Investigation #1 Soil Sense: What is soil?	Investigation #2 Soil Science: What is soil made of? Where does it come from?	Investigation #3 Under My Feet: Who and what lives in soil?
<p><b>LARGE GROUP LEARNING</b></p> <ul style="list-style-type: none"> <li>• Do a KWL chart or concept map about soil</li> <li>• Generate a list of soil words – mud, soil, sand, gravel, dirt</li> <li>• Soil sense: Have a few different soil samples to feel, smell, talk about.</li> <li>• Soil in a jar</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and contrast different soil samples</li> <li>• Observe a decomposing log; discuss living, non-living, “was living”</li> <li>• What is soil made of? Can we make soil?</li> <li>• Make soil in a can</li> <li>• Soil layers jar</li> <li>• Make rock dust</li> </ul>	<ul style="list-style-type: none"> <li>• Who and what lives underground – roots, bugs, amphibians, mammals, etc.</li> <li>• Soil critter movement</li> <li>• X-ray goggles to look into the soil</li> <li>• Soil bug match-up</li> <li>• Bug museum</li> <li>• Ant farm</li> <li>• Make a 3D underground model</li> </ul>	<ul style="list-style-type: none"> <li>• Design a bug</li> <li>• Decomposing log terrarium</li> <li>• Bring in soil and look for organisms</li> <li>• Soil Safari</li> <li>• Bug lab</li> </ul>
<p><b>SMALL GROUP LEARNING</b></p> <ul style="list-style-type: none"> <li>• Sort/classify different soil samples</li> <li>• Soil smudges or rubbings</li> <li>• Weigh and sift soil</li> <li>• Investigate mud</li> </ul>	<ul style="list-style-type: none"> <li>• Search for erosion outside – streams with silt and mud; ravines from heavy rains, etc.</li> <li>• Find things “turning into soil”; leaves, logs, rocks, etc.</li> <li>• Dig soil pits in different locations: forest, garden, field</li> </ul>	<ul style="list-style-type: none"> <li>• Soil making table</li> <li>• Paint pan erosion</li> <li>• Erosion table experiments</li> <li>• Soil sifting (sieves, coffee filters, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Animal homes in soil – animal holes, worm castings, ant hills.</li> <li>• Coverboards</li> <li>• Pitfall traps</li> </ul>
<p><b>OUTDOOR LEARNING</b></p> <ul style="list-style-type: none"> <li>• Go for a soil walk to experience different types of soil in your schoolyard or neighborhood – gather samples along the way</li> <li>• Try a walk on different weather days to notice differences in soil texture, smell, etc.</li> </ul>			



<b>BIG IDEAS</b>	<b>Investigation #4 Wiggly Worms</b>	<b>Investigation #5 How do People Use Soil?</b>	<b>Investigation #6 Construction Site: Engineering with Soil</b>
<b>LARGE GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• What is a worm?</li> <li>• Compare and contrast worms and caterpillars</li> <li>• Watch a worm!</li> <li>• Move like a worm</li> <li>• Worm Concept Map</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss all the ways that people use soil</li> <li>• Bring a bag full of veggies—which grew in the soil? What grows in above the soil and what grows in the soil?</li> <li>• Seed sprouting</li> <li>• Read the book and make <i>Stone Soup</i></li> </ul>	<ul style="list-style-type: none"> <li>• What can we make with soil?</li> <li>• Show pictures of people around the world who build with dirt or mud</li> <li>• Animals that use mud or soil –birds make nests out of mud; beavers use mud in their dams; ants and termites use soil, sand, or mud</li> <li>• Who likes to play in the mud? People, animals...</li> </ul>
<b>SMALL GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• My worm is...</li> <li>• Measuring worms</li> <li>• Worm puppets</li> <li>• Worm sculpture</li> <li>• Paint with worms</li> <li>• Worm Farm</li> </ul>	<ul style="list-style-type: none"> <li>• Sow seeds; make a window sill garden; plant in egg shells; cookie cutter gardens</li> <li>• Plant Olympics</li> <li>• Compost 2 liter bottles</li> <li>• Paint with mud/clay</li> <li>• Forest/garden restaurant</li> <li>• Start a compost pile</li> </ul>	<ul style="list-style-type: none"> <li>• Construction projects with dirt/mud</li> <li>• Make a construction site of different materials—use tools/toys to move through different materials—soil, sand, mud, etc.</li> </ul>
<b>OUTDOOR LEARNING</b>	<ul style="list-style-type: none"> <li>• Worm Expedition: Search for worms outside in all sorts of weather.</li> <li>• Worm charming</li> </ul>	<ul style="list-style-type: none"> <li>• Plan and plant a garden</li> <li>• Edible schoolyard garden</li> <li>• Family picnic</li> <li>• Farm or restaurant field trip</li> </ul>	<ul style="list-style-type: none"> <li>• Mud Kitchen</li> <li>• Make mud pies, mud balls</li> <li>• Frozen mud balls</li> <li>• Making and building with bricks made of mud</li> </ul>



# Soil Sense

**What is Soil?**

**How does it feel?**

**How does smell?**

## LARGE GROUP LEARNING ACTIVITIES

**What is Soil?** Most children have some experience playing in the dirt, mud, or sand. Take some time as an introduction to learn what your students know about soil. What do they think it is made of? Do they think it is alive or dead? Use a K-W-L chart as students describe their own experiences with soil (or dirt!).

What do we <b>KNOW</b> ?	What do we <b>WANT</b> to know?	What did we <b>LEARN</b> ?
Soil makes plants grow	Where does soil come from?	
Soil is muddy	Is soil the same as dirt?	

**Soils in a Jar:** Show the students 3 or more jars full of soil. Collect soil from three different locations so that your samples look different in color and texture. Collect soil samples by digging down several inches below the surface with a garden trowel. You could collect soil from a yard, garden, forest, river bank, compost pile, or worm bin. To be certain that your samples do not contain any toxic or dangerous materials it is best to avoid vacant lots or roadsides. Ask the students what is in the jars. What is soil? Why is it important? What do they notice about the different soil samples? Ask them to describe what is different and what is the same.

**Soil Sense:** While sitting in a circle, give each student a white paper plate. Place a large spoonful of soil on each student's plate one sample at a time. For each sample, ask the students to smell the soil and describe what it smells like. Ask them to take a pinch of soil and rub it between their fingers and describe what it feels like. Have them put some soil in their hand and squeeze it; is it wet or dry, soft or firm; does it stick together or fall apart? Go through each soil sample and explore the same properties one by one. Talk about the many different characteristics of soil – color, texture, moisture, etc.

**Soil Words:** Generate a list of soil words: soil, dirt, muck, mud, dust, loam  
Generate a list of descriptive words about soil based on their experience with the soil samples.

**Read a Soil Story-** suggested books are in the resources section

**Sing: Dirt Made my Lunch by The Banana Slug String Band**  
[www.songsforteaching.com/bananaslugstringband/dirtmademylunch.htm](http://www.songsforteaching.com/bananaslugstringband/dirtmademylunch.htm)



## OUTDOOR LEARNING ACTIVITIES

**Community Connection:** Ask children to bring in soil samples from home in Ziploc bags. Transfer the samples to baby food or jelly jars. These samples can be looked at as a large group or can be placed in your science discovery area for additional small group learning. See related activities related to soil samples in Investigation #3.

### SMALL GROUP LEARNING ACTIVITIES

**Sorting Soil:** Have different soil types and soil samples for children to sort and classify. Have examples of sand, silt, clay, gravel, mud, compost, forest soil, potting soil. Invite them to sort the soil in different ways.

**Soil Smudges:** Using the different soil samples begin an artistic exploration of soil by simply smudging it. Take a pinch of soil with fingers and rub it on a white sheet of paper without adding water. This process helps children feel the texture of different soils and notice the different color rubbings the different soil samples make. Try making a picture by just using soil smudges!

**Soil and Water = Mud:** Add water to different soil samples and try to make mud. Do some soil samples make better mud than others? Document which soil samples make the best mud for later when you make mud bricks in Investigation #8.

**The Weight of Soil:** Weigh the soil before and after you add water. What happens to the soil when you add water? Put the soil in a small strainer over a cup. Does the water pass through some samples, but not another? Which soils retain the most water?

**Sifting Soil:** Sift soil over a white dishpan or bucket using household strainers or colanders. Use strainers with different sized holes. Try using the strainers in sequence from large holes to small holes. What falls through and what gets stuck in each strainer? What ends up falling through all the holes?

**Soil Walk:** Go for a soil walk to experience different types of soil in your schoolyard or neighborhood. With trowels and Ziploc bags or small jars collect samples to bring back to the classroom. Try to collect soil from a few different locations to get different soil types—hard packed areas, under trees, sandy area, gravel area, etc. As you collect your samples, notice:

- Is it hard or easy to dig?
- If it's hard, how can you loosen it?
- Is the soil wet or dry?
- Is it wetter or drier as you dig deeper?
- What does the soil feel like? Smell like?
- Do you see anything besides soil in your sample? Seeds, leaves, bugs?

Label your soil samples. You can even bring a map along with you and make a number on the map where you collected each sample that corresponds with your container.

**Soil in any Weather:** Take walks on different weather days to notice the differences in smell, texture, color, moisture. On a wet, muddy day, read *One Duck Stuck*, and then go for a soil walk.

**Get Stuck in the Muck:** Read *One Duck Stuck*, Head outside in your rain boots and find muck to get stuck in. What does it feel like when we get stuck in the muck? Does it make a sound when you pull our boot out of the muck? Do you need help from friends when you get stuck in the muck? No muck in your schoolyard—make some muck! See Investigation #8.



## Soil Science

What is soil made of?

Where does it come from?

Where does it go?

### LARGE GROUP LEARNING ACTIVITIES

**Soil Science:** In large group, review your soil samples from Investigation #1. Compare and contrast different soil samples with a sorting chart. How are the textures, color, moisture content the same or different? Did students find any living things in their soil? If so, try to describe and or draw them.

**A Slice of Earth:** Make a “cross section” drawing of soil—what did students find as they explored soil. What do we find in the top layers? What do we find as we dig deeper? Draw a model for what a cross section of soil looks like. Make a 3D model under a circular table of a cross section of soil.

**Living, Non-Living, Once Living:** Bring in a decomposing log. You can put it in a terrarium for close observation. Gather around the log—observe and discuss what is happening to the log.

**Soil in a Can:** What is soil made of? Try making soil! Fill an old coffee can with soil ingredients—leaves, sticks, “starter dirt”, etc. Put on the lid and see if you can make soil.

**Rock Music (Inside or Outside):** Find a variety of different kinds of rocks. What happens when you grind them together. When you bang them to make “rock music”, do you make dust? These small particles of rock are the non-living “ingredients” of soil!

**Soil Layers in a Jar:** Using your soil samples from Investigation #1 or new samples, add water to different soil samples in an old mayonnaise (or similarly shaped) jar. Make sure the cap is securely fastened. Shape the jar with water and let the soil settle. What happens as the soil settles? Let it sit over night. Do you see different layers? Do you notice anything floating at the top?

### SMALL GROUP LEARNING ACTIVITIES

**Recipe for Making Soil:** Materials: buckets of sand, silt, clay, rocks, potting soil (dark like humus layer), fake bugs and worms (made by students with found objects or art supplies), apron, chef hat. Set up a kitchen area for making soil. Who makes soil in nature? Let children experiment with different soil ingredients to make soil. Can they do it?

Have students rub 2 rocks together, to simulate weathering, over a paper plate. Give them dead leaves and have them crush them up as fine as they can, to simulate decomposition, over the same plate. What else do they need to add to make soil?



**Erosion “Tables”:** Fill roller paint pans with packed down soil. Use a finger or small stick to make furrows in different patterns – make line (III) or channel (VVV) or stream (SSS) shapes in the pan. Add water slowly at the top on the pan and observe the flow of water. Which patterns allow the water to travel the fastest, the slowest? Which patterns cause the most erosion? What happens when you increase the slope of your pan? Try adding some blocks under the top of the pan to make your “hill” steeper. How do these changes modify the way the water flows?

### More experiments with your Erosion Table

- Add objects to your erosion table: sticks, rocks, grass, etc.
- Have water drip out of cups with different sized holes drilled in the bottom. Balance cup or cups at the top to simulate water flowing down a hill.
- Experiment with different types of soil
- Use a “shower” watering can to simulate rainfall
- Other ideas that the kids come up with!

**Messing Around with Soil:** With several soil samples from a variety of sources and locations (garden soil, potting soil, forest soil samples, yard samples, sand, silt, clay), set up a small soil lab in the classroom. Materials include, but are not limited to, spoons, popsicle sticks, sieves (with different sized holes), white trays or plates, magnifying glasses, tweezers, white and black construction paper. To contain the mess, you can have students work on baking sheets.

Examine the soil samples using the provided materials. Students can sift soil onto the different colors of paper. Observe the soil with magnifiers. Use tweezers to pick out soil treasures to explore under magnification. Document what students are curious about and note their questions about soil on a question board.

## OUTDOOR LEARNING ACTIVITIES

**Lens on the Litter:** Using paper plates with the center cut out; have pairs of student sit down to explore the forest floor. Let them know they will be exploring all of the things on top of the

soil—what we call the leaf litter. Have them collect examples of what they find on a large piece of white cardboard, make drawings, and note any living things they find in the litter (worms, critters, etc.)

**Erosion Walk:** Find examples of erosion by taking a walk. Where do you see water that has made a “stream”? Do you see trails of soil that traveled downhill during a heavy rain?

**Soil Layers Pit:** In the forest or garden, dig a small soil pit. Dig down layer by layer—litter, duff, humus, inorganic material. Notice the different layers of soil. Can you dig down far enough to get to mostly “inorganic” or “non-living material”? Place a sample of each “layer” on a white paper plate to examine more closely. Use a soil chart to notice the differences between the different layers – color, texture, moisture, living organisms.

**Turning into Soil:** Find things that are “turning into soil” – leaves, logs, snags, rocks, etc. Can you make dust when you scrape two rocks together? Search for logs that are decomposing—how are they breaking down? Are any living things helping them to break down? What’s happening to the logs as they break down or decompose?



# Under my feet: Who lives in the soil?

## LARGE GROUP LEARNING ACTIVITIES

**Who lives Underground?** Discuss as a group all of the animals that live underground. Create a felt or magnet board so that you can talk about how some animals (mammals, amphibian, insects, other critters) live underground and some just visit. See resources for example of a magnetic board that demonstrates the underground habitat.

**Soil Critter Movements:** How do all of the critters that live underground move? Wriggle like a worm, walk like a beetle, stride like a centipede, dig like a mole, etc.

**Soil Bug Match-Up:** Introduce new soil critters to students by playing a large group game of soil bug match-up. Create pairs of flash cards of soil animals – ground beetles, earthworms, pillbugs, moles, salamanders, etc. Ask students to note the different characteristics of the “bugs” and match up into pairs. Have them invent a name for their bug that describes it.

**Bug Museum:** Each child chooses a soil bug that they find especially interesting and put it in a bug box (old baby food jars with holes poked in the top work well). They share their bug with other students by describing it and talking about what they find interesting about their bug. Note: You can also purchase bug boxes commercially

**Please Note:** It is important to always model safe capture and release whenever handling living organisms. This starts with ensuring that there are no substances on your hands that might harm the animals – particularly bug spray or sunscreen. With thin-skinned soil organisms such as worms it is even good to have some dirt and/or moisture on your hands to help keep them from drying out while you look at them. Be careful and gentle at all times. Return all organisms to the area where they were found.

**Ant Farm:** Bring an ant farm into the classroom. Have student observe any behavior in the classroom and compare to the ants you find and study during outdoor explorations.

**X-Ray Goggles:** Make X-ray goggles out of old paper towel tubes and aluminium foil and have children decorate them. Use your X-ray goggles to imagine what is living under the ground. What would it be like to see underground? What kind of things would be under our feet—tree roots, worms, moles, voles, millipedes?

**Building a 3D model of Soil and its Inhabitants:** Using your imagination and information from non-fiction literature, design and build a 3D model of the underground habitat. A circular table works well—include tree roots, worms, centipedes, pill bugs, and all of the organisms you have found during your soil explorations.

**Read:** *Dirt: The Scoop on Soil* by Natalie Rosinsky



## SMALL GROUP LEARNING ACTIVITIES

**Design a Bug:** Once you have studied different bugs that live underground, ask students to design and build their own soil bugs. They need to think about how it moves through the soil, what it eats, and what might eat it...unless it's a top underground predator!

**Buggy Logs:** Make an underground terrarium. Be sure to include a decomposing log that may host a diversity of different organisms. Dissect the decomposing log to search for millipedes, pill bugs, ants, and other critters. Make a chart of what you find!

**Soil Safari:** Shake soil samples through a kitchen sieve onto a white sheet of paper. What do you find? What was living in the soil that you didn't see before you sifted the soil?

## OUTDOOR LEARNING ACTIVITIES

**Ant Hill & Worm Castings Hunt:** Look for these helpful animals on your walk. Talk about how they recycle and move soil around—they're nature's bulldozers!

**Coverboards:** Put a 2' square piece of plywood on the ground in your schoolyard or within walking distance of your school. Visit the coverboards regularly to see who is living underneath. Mark your coverboards so people who happen upon them know that you are studying what lives in the soil. Compare 2 different study locations.

**Animal Homes:** Search for underground animal homes—can you find any holes where a small mammal might reside? Imagine where animals might go while they are underground.

**Resources:** *Life in a Bucket of Soil* by Alvin and Virginia Silverstein



# Wiggly Worms

## LARGE GROUP LEARNING ACTIVITIES

**What is a worm? What makes a worm a worm?** With the children, start a KWL chart about worms. What do children already know about worms; what do they want to know about worms? Add additional “want to know” items based on the activities that you have planned.

Have on hand a big stuffed worm or a blown-up picture of a worm. Worms are invertebrates—that means no backbone. Have children feel their spine and ask them if they have a backbone? What would happen if they didn’t? They might move like a worm! Worms usually lack appendages or legs. There is an exception, but most of the worms that you will observe will not have appendages. That inch worm you see dangling from the trees in spring is actually not a worm, it’s a caterpillar. It has legs. But, the word “worm” is often used to describe other things beside animals that are actually worms. Most interesting, different species of worms live in different habitats. We can find worms underground, in ponds, and even in the ocean.

**Watch a Worm** The best way to get to generate more questions about worms is to observe them. Each child will need a white paper plate, a damp paper towel, a magnifying glass, and a worm or two. Have a spray bottle filled with water on hand, too. First make sure that all the children’s hands are clean and clear of any soap, bug spray, or lotion. Explain that any of these products could harm the worm. Dampen the paper towels and hand them to the children. Share that the paper towel is also to help protect the worm from drying out. Ask the children where worms normally live? Do they remember from their explorations of soil what it felt like underground? Was it moist or dry?

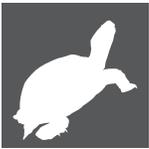
Give each child a worm to observe. Ask them to observe the worm silently—just with their eyes for one minute. After one minute, have them share all of their thoughts about the worm as well as all of their questions. Document their thoughts and questions on a chart. You may also invite the children to touch the worm after they have settled into observation. Demonstrate how to touch the worm carefully. This involves touching the worm with one or two fingers. Do not stroke or pet the worm as this can be very damaging to their skin. Our skin is like sandpaper to a worm – you wouldn’t want someone rubbing your arm with sandpaper even if they are trying to be gentle.

Ask the children to notice the characteristics of their worm:

- The shape and/or pattern of its body from one end to the other
- Color
- Movement
- Can they find the head and the tail? (see diagram)

Look for:

- Does it have a mouth?
- Does it have eyes and ears?



Have children carefully measure their worms—are they all the same length? Record the length of their worms on their observation page.

**Worm Concept Map:** Make a Worm Concept Map based on what children notice or know about worms after their initial observations.

**Wriggle like a Worm:** Have the kids move like worms to get their own wiggles out before you move onto the next activity! Explain how worms move by contracting and releasing their muscles—or squeezing and stretching. Have kids squeeze and stretch (or wriggle) in unison across the floor!

**Read:** *Wiggling Worms at Work* by Wendy Pfeffer and Steve Jenkins

## SMALL GROUP LEARNING ACTIVITIES

**My Worm is...** Have all children finish the sentence, “My worm is...” Make a worksheet with room for a drawing with their completed “My Worm is...”. Ask them to make an observation drawing of a worm noting the characteristics that they learned in their worm observations.

**Read:** *Diary of a Worm* by Doreen Cronin  
Have children make a Venn diagram of a worm’s life and their life—how are they the same? How are they different?

**Measure your Worm:** Create a “How Long is your Worm” chart with data from your worm observation. Create measuring units with different children’s worms. “That book is three of Brendan’s worms.”

**Worm Puppets:** Make worm puppets out of old socks and decorate. Have a worm puppet show.

**Worm Sculptures:** Make worms out of a variety of different art materials: Pipe Cleaners, egg cartons, string cheerios on pipe cleaners, pasta

worm necklaces, etc.

**Paint with Worms:** Paint with rubber worms you buy at a fish tackle store.

**Make a Worm Farm :** This is a great resource for making a simple worm farm in a recycled soda bottle. <http://letkidscreate.blogspot.com/2012/04/making-worm-farm.html>

**Read:** *Garden Wigglers* by Nancy Loewen

## OUTDOOR LEARNING ACTIVITIES

**Worm Expedition:** Go for a walk outside to look for worms. Where might you find them? If you have a garden, dig in the dirt to look for worms. Try a walk in all sorts of weather—do you find more worms on different weather days? Why or why not? Where do you find them?

**Wood Turtle Stomp:** Wood turtles stomp their feet and sometimes thump their shells against the ground to attract worms. The vibrations bring the worms to the surface and the turtle then eats the worms.

The turtle rapidly taps one front foot against the ground (about once per second) while rocking back and forth. The turtle then switches and taps with the other front foot, and sometimes also thumps its bottom shell against the ground. Children can actually draw worms to the surface doing the same kind of tapping or stomping.

**Read:** *An Earthworm’s Life* by John Himmelman or *Wiggle and Waggle* by Caroline Arnold



# How do People use Soil?

## LARGE GROUPS LEARNING ACTIVITIES

**Soil in our Lives:** Discuss all of the ways that people use soil—for growing food, for building things, for playing.

**Where does our food come from?** During circle time, introduce the concept of where food comes from and how fruits and vegetables grow. Prepare a bag of foods that grow in the soil. Pull out one at a time and ask the children to sort them based on whether the part we eat grows in the soil or above the soil. It's fun to have a large piece of chart paper that represents the area above and below the soil.

**Read:** *Stone Soup*. Have each child bring a designated ingredient to school. Teacher provides the “stone”. Together, prepare and share soup as a class.

**Seed Sprouting:** In a large group, ask children to scrunch up tiny as a seed planted in the soil. Have one child be the rain and “sprinkle” the other children. Have a second child act as the sun to shed light. Encourage the children to slowly begin to push up through the dirt, sprouting and reaching towards the sunlight.

## SMALL GROUP LEARNING ACTIVITIES

**Sowing Seeds:** Start an edible indoor garden. Begin with small pots and soil. Provide various vegetables and herb seeds. Have them observe the seeds. Provide pictures or the packet for each seed to see if they can make predictions regarding which seed can produce each fruit, vegetable, or herb. Designate a chart for what the plant will need each day and who will be responsible. Keep an observation journal to keep track of the plant's growth. Some different variables can also be introduced. Plant the seeds in different containers- small pots, egg shells, cleaned out jack-be-little pumpkins, etc. Use seeds that don't sprout to start a compost pile.

**Tray/Cookie Cutter Gardens:** Fill a small planting tray with soil. Using stencils or cookie cutters, set one into the soil and fill it with fast sprouting edible seeds. Seeds will sprout in the shape of the stencil. Try vegetable shapes!

**Window Sill Herb Garden:** Provide planting pots, soil, and edible herb seeds such as basil, oregano, chives, and cilantro. Have children plant seeds, water them, and place pots in a sunny window sill. Use the herbs for cooking.

**Plant Olympics:** Set up various events for children to participate in. For example, start 4 seeds at the same time and document which sprouts first. Or, plant 4 fast sprouting seeds (scarlet runner beans) each in its own pot. Measure each one as it grows and chart which grows the tallest.



## OUTDOOR LEARNING ACTIVITIES

**Garden Plot Planning:** Have children measure out a garden plot. Estimate and measure how much space will be needed between each seed and each row.

**Edible Schoolyard Garden:** Designate an area in your schoolyard that can be turned into a garden. Once the soil is reasonably prepared, provide the children with tools to work the soil, divide the rows, and create space for plants and new seeds. Whatever has survived from your indoor garden can be transplanted here in spring.

**Family Picnic:** Prepare recipes from your edible herb gardens and ask families to come for a picnic. Combine this with stone soup day!

**Field Trip:** Visit a local farm or restaurant. Invite a farmer or chef or local grocer to talk about crops and vegetables that are grown in the soil.

**Forest/Garden Restaurant:** Indoors or outdoors, set up a small table and chairs. Add cookware and “vegetables” that are grown in the soil. Add chef hats, aprons, and “menus” along with note pads and pencils for taking orders.

**Mud Painting:** Provide various tools (pine branches, bark, etc.) and different surfaces (paper, textured paper, fabrics). Have children mix soil and water to make mud paint of desired consistency and texture.

**Edible Dirt:** Chocolate Pudding, Chocolate Cake Crumbs, Oreo Cookie Crumbs, Gummy Worms. A healthier alternative would be to use yogurt and dried fruit. Mix up your own edible dirt or mud!

**Read:** *Mud Pies and Other Recipes* by Marjorie Winslow

**Make Compost Bottles:** Materials: 2 liter soda bottle, soil, leaves, newspaper, vegetable peels, etc. The clear soda bottle is perfect for keeping an eye on the changes that are happening within your compost and it’s a great way to recycle something that would have otherwise ended up in the trash.

Cut the top off the soda bottle and rinse it out well. Remove the label so that you can see inside the whole bottle. Start with a layer of soil on the bottom and alternate between soil and compostable material—leaves, food waste, etc. Make sure your bottle is moist but not wet. Cover the top of the bottle to keep out flies and keep moisture in but make small holes in the cover. It’s important that your bottle can get air as good compost needs oxygen!

**Start a Compost Pile:** Compost can have lots of different ingredients. Brown waste, green waste, food waste! You can even compost with worms to speed things up.

**Super Easy Food Waste Compost**  
[www.gardenguides.com/126540-compost-preschool-classroom.html](http://www.gardenguides.com/126540-compost-preschool-classroom.html)

**Read:** *Compost Stew* by Mary McKenna Siddals



# Construction Site: Engineering with Soil

## LARGE GROUPS LEARNING ACTIVITIES

**Shelters of Mud:** Introduce children to pictures of structures made from mud (adobe) and the people that create and use them around the world. Ask the children what they think can be made out of mud. Pose the questions prompting who else might make a home or shelter using mud. Have a bird nest with a mud base available for the children to investigate. Continue to the discussion regarding other animals such as beavers that build and live in mud and stick shelters.

## SMALL GROUP LEARNING ACTIVITIES

**Construction:** On a sensory table provide children with construction materials such as sticks, stones, wood and other scraps, mud, clay, soil, and straw. You might also include mud bricks and small construction vehicles. Ask them to create structures for people and animals.

**Clay Sculptures:** Combine clay with different natural materials such as shells, feathers, sticks, cones, leaves. Encourage children to mold and press objects into clay. Sand may be added for interest, texture, and experimentation.

**Mud Sculptures:** Mix various types of soil together with water. A strainer can be provided to mix ingredients and sieve out pebbles, sticks, leaves, etc. When mud is smooth, children can roll, drip, and drop mud into sculptures.

## OUTDOOR LEARNING ACTIVITIES

**Mud Tracking:** On a rainy day, take children outdoors for mud walk. Have them notice what it feels to walk in the mud as opposed to a dry patch of firm soil on a path. Draw attention to footprints and tracks. Look for other tracks along the way.

**Mud Balls, Bricks, and Pies:** Play with mud and experiment to make a variety of objects. Playing with mud is the perfect sensory activity. For Bricks: offer water and soil in separate bins and allow children to mix together. Add straw to some of the mixture and leave the rest aside. Provide various containers for children to fill with the different batches of mud mixtures. Ice cube trays and half pint milk containers work well. Allow bricks to dry completely then pop them out for building.

### Make mud balls and put them in the freezer.

What happens when mud freezes?

- From soil to mud and back to soil—let students experiment with how they can change the properties of soil and mud.
- Make a mud mountain and pour water on top to create erosion.



- Create a safe place to make a “mud walk”. Make a path of mud and have children feel the mud squish between their toes!

**Design and Create Mud Kitchen:** Create an outdoor space that has a sense of enclosure but is not separated from the rest of the play yard. Add work surfaces and shelving. Introduce an interesting selection of pots, pans, jugs, buckets, and utensils. Have an available source of soil and water nearby. A hose is a great addition for cleanup time. Different soil types and plant materials to add will keep the cooking interesting.



Title	Author	Description
<i>One Duck Stuck</i>	Phyllis Root and Jane Chapman	A fun book to read aloud about a duck that gets stuck in the muck. Something children can relate to while exploring a muddy day!
<i>The Piggy in the Puddle</i>	Charlotte Pomerantz, James Marshall	A story in-verse about a piggy that love to be in the mud.
<i>Dirt: The Scoop on Soil</i>	Natalie Rosinsky	Nature, Uses, and Importance of Soil. <b>Spanish Version available.</b>
<i>Dirt: Jump into Science</i>	Steve Tomecek and Nancy Woodman	A fun and fact-filled picture book about soil and the things that live there.
<i>Wiggling Worms at Work</i>	Wendy Pfeffer and Steve Jenkins	Learn about the work of worms in the soil. They're busy!
<i>Diary of a Worm</i>	Doreen Cronin	A charming story about a small worm in a big world.
<i>Compost Stew</i>	Mary McKenna Siddals	An easy how to book about making a compost pile as well as other ways young children can care for the Earth.
<i>An Earthworm's Life</i>	John Himmelman	Beautifully illustrated book about the life cycle of the worm.
<i>Garden Wigglers</i>	Nancy Loewen	Characteristics, biology, and anatomy of earthworms.
<i>Wiggle and Waggle</i>	Caroline Arnold	Two worm friends dig in the dirt, work hard, and sing songs.
<i>Mud Pies and Other Recipes</i>	Marjorie Winslow	A make-believe cookbook using items from nature.
<i>Stone Soup</i>	Marcia Brown	Three hungry soldiers make a feast from stones...or do they?



<b>Tools for Learning</b>	<b>Where to Find</b>	<b>Description</b>
Soil Sifters	Home Depot, Garden Store, Amazon	Colanders or homemade screen sieves can also be used.
Trowels, Spoons, Jars, Tweezers, etc.	Garden/Hardware, or Grocery Store	Great tools for exploring soil. These household items can be requested as donations or as loaners for the unit.

## TEACHER'S BIBLIOGRAPHY

<b>Title</b>	<b>Author</b>	<b>Description</b>
<i>Discovering Nature with Young Children</i>	Chalufour and Worth	This explores the wide-ranging elements that make up the natural world around us. The curriculum replaces simple fact-feeding practices with the development of long-term scientific reasoning.
<i>Hands-on Nature</i>	Jenepher Lingelbach	Grouped around five themes (Adaptations, Habitats, Cycles, Designs of Nature, and Earth and Sky), fact-filled essays introduce each subject, followed by field-tested, experiential activities that engage students in learning about the natural world.
<i>Nature's Playground</i>	Fiona Danks	Children will learn how to build a den from branches, make twig boats to sail across a pond, and voyage through the backyard to find tiny insects and creatures.
<i>Mudpies to Magnets: A Preschool Science Curriculum</i>	Williams, Rockwell, and Sherwood	224 hands-on science experiments and ideas with step-by-step instructions delight and amaze children as they experience nature, the human body, electricity, floating and sinking, and more.
<i>More Mudpies to Magnets: A Preschool Science Curriculum</i>	Williams, Rockwell, and Sherwood	Develop the natural scientist in every child with 260 hands-on science activities and ideas.
<i>Small Wonders: Nature Education for Young Children</i>	Linda Garrett, Hannah Thomas	Introduces children ages three through kindergarten to the natural world in a special hands-on way.



<i>Growing Up Wild</i>	Thorsten Milse · C.J. Bucher	To observe young animals in their natural surroundings is a special event. Luckily, wildlife photographer Thorsten Milse has captured them for us - young cheetahs at play in the Namibia, fluffy little penguins in the Antarctic, lumbering polar bear cubs in northern Canada, curious mini-kangaroos in the Australian bush, and shy tiger cubs in the jungles of India. And lets not forget the entertaining young gorillas in the rain forests of Rwanda!
<i>Soil: Get the Inside Scoop</i>	David Lindbo	Get to know different types of soil and meet scientists who study it. For children and teachers.
<i>Microlife that Lives in the Soil</i>	Steve Parker	A close-up look at the micro-life that lives in soil.
<i>World Beneath our Feet: A Guide to Life in the Soil</i>	James Nardi	This book uncovers a secret world full of life just under our feet. A good reference book for studying life in the soil.
<i>Life in a Bucket of Soil</i>	Alvin and Virginia Silverstein	Another great reference for curious minds about the creatures that live in soil—what they eat, how they move, and their “niche” in the soil habitat.
<i>Healthy Food from Healthy Soils</i>	Elizabeth Patten and Kathy Lyons	A teacher resource for where our food comes from, how its grown, and how it turns back into soil.
<a href="http://www.soils4kids.org/home">www.soils4kids.org/home</a>		Background Resource
<a href="http://www.preschooleducation.com/sgarden.html">www.preschooleducation.com/sgarden.html</a>		Background/Resource
<a href="http://urbanext.illinois.edu/soil/songs/songs.htm">http://urbanext.illinois.edu/soil/songs/songs.htm</a>		Soil Songs

### Mud Pie Song

*Sung to the tune of: “Sing A Song of Sixpence”*

Sing a song of mud pie,  
The best in all the land.  
Mix it till it’s mushy,  
Squeeze it in your hand.  
Put it in a pie tin,  
Leave it in the sun.  
Wait about an hour,  
Then you know it will be done!

### Planting Time

*Sung to the tune of: “Row, Row, Row Your Boat”*

Dig, dig, dig the earth (make digging motion)  
Then we plant our seeds (pretend to drop seeds, cover them with soil, and pat the soil firm)  
A gentle rain (flutter fingers down)  
And bright sunshine (circle arms above head)  
Will help our flowers grow (crouch down and then slowly stretch up tall with arms overhead)



# TREE-MENDOUS TREES

## STEM Preschool Teaching Unit



**Ages 2.9-5 years**

**[www.massaudubon.org/education](http://www.massaudubon.org/education)**

**T**rees are found just about everywhere, so they are familiar to young children. Trees are kid-friendly to explore, interesting to learn about, and easy to appreciate. This unit offers seven different investigations about trees:

1. Introduction to trees
2. What are the parts of a tree?
3. How are trees classified?
4. How does a tree grow? How does a tree make pinecones or acorns?
5. Why do leaves change color in the fall?
6. Who lives in trees?
7. How do trees help us?



**T**rees are abundant in most neighborhoods and schoolyards. They are also engaging tools for learning and discovery. Trees are places to play and at the same time a home for many species of wildlife. They also are an important natural resource for humans. Trees come in different shapes and sizes and are a wonderful way to study life cycles and parts of a whole.

When a young child learns about trees, he/she is learning about the entire world of plants, animals, and seasonal cycles in the natural world.



**Investigation Objectives and Alignment to  
Massachusetts Department of Education Pre-K Science, Technology  
and Engineering Standards 2013  
for 2015-2016 implementation**

Investigation	Children will be able to:	PRE-K Learning Standards
<p><b>#1</b> <b>Introduction to trees</b></p>	<ul style="list-style-type: none"> <li>• Name characteristics of what makes a tree</li> <li>• Compare the life cycle of a tree to another common plant,</li> <li>• Describe trees are living things because they need food, water, shelter, and air to grow and reproduce.</li> </ul>	<p><b>PreK-LS2-2(MA).</b> Using evidence from the local environment explain how familiar plants and animals meet their needs where they live.</p>
<p><b>#2</b> <b>What are the parts of a tree?</b></p>	<ul style="list-style-type: none"> <li>• Demonstrate (role-play) the parts of a tree</li> <li>• Design a new tree, using all its parts</li> </ul>	<p><b>PreK-LSI-1(MA).</b> Compare, using descriptions and drawings, the external body parts of animals (including humans) and plants and explain functions of some of the observable body parts.</p>
<p><b>#3</b> <b>How are trees classified? Why do some trees have leaves in the winter and some do not?</b></p>	<ul style="list-style-type: none"> <li>• Separate pictures of trees into categories</li> </ul>	<p><b>PreK-PS4-2(MA).</b> Connect daily experience and investigations to demonstrate the relationships between the size and shape of shadows, the objects creating the shadow, and the light source.</p>
<p><b>#4</b> <b>How does a tree grow? How does a tree make pinecones or acorns?</b></p>	<ul style="list-style-type: none"> <li>• Describe the life cycle of a tree</li> </ul>	<p><b>PreK-LSI-2(MA).</b> Recognize that all plants and animals grow and change over time.</p> <p><b>PreK-LS3-1(MA).</b> Use observations to explain that young plants and animals are like but not exactly like their parents.</p>
<p><b>#5</b> <b>Why do leaves change color in the fall?</b></p>	<ul style="list-style-type: none"> <li>• Describe the life cycle of the tree</li> </ul>	<p><b>PreK-ESS2-5(MA).</b> Describe how local weather changes from day to day and over the seasons and recognize patterns in those changes</p> <p><b>PreK-ESS2-6(MA).</b> Understand the impact of weather on living things.</p> <p><b>PreK-LSI-2(MA).</b> Recognize that all plants and animals grow and change over time.</p> <p><b>PreK-PS2-2(MA).</b> Through experience, develop awareness of factors that influence whether things stand or fall.</p>



<p><b>#6:</b> <b>Who lives in trees?</b></p>	<ul style="list-style-type: none"> <li>• Look for evidence of living things in a nearby tree</li> </ul>	<p><b>PreK-ESS2-1(MA).</b> Raise questions and engage in discussions about how different types of local environments (including water) provide homes for different kinds of living things.</p> <p><b>PreK-LS2-3(MA).</b> Give examples from the local environment of how animals and plants are dependent on one another to meet their basic needs.</p>
<p><b>#7:</b> <b>How do trees help us?</b></p>	<ul style="list-style-type: none"> <li>• Name two food we get from trees</li> <li>• Name two ways they are important</li> </ul>	<p><b>PreK-PSI-3(MA).</b> Differentiate between the properties of an object and those of the material of which it is made.</p>



## Suggested outdoor exploration materials

- Images of trees
- String or yarn
- Coffee filters
- Hand lenses
- Popsicle sticks
- Clipboards (can attach pencils with string or velcro)
- Trowels (small shovels)
- Penlight or other small flashlight
- Small plastic containers to hold living things
- White plastic plates to observe samples
- Ziploc bags, various sizes
- Plastic terrariums
- Spray bottles
- Measuring tapes or string
- Disposable or digital camera
- Crayons and markers (fine and thick point)
- Paints
- Clay or play dough
- Collage materials
- Bendable wire or pipe cleaners

## Keep it easy!

- Assemble outdoor kits in backpacks to pick up and go as you walk outdoors!
- Families will gladly save and send in recyclable containers that are both reusable and disposable. Just ask!





# TREE-MENDOUS TREES

## Basic Concepts and Fun Facts

### What is a tree?

- Trees are not a well defined biological group like birds or insects. A tree is definitely a plant, but the definition of a tree can be very broad.
- A commonly accepted definition of a tree is: A tree is a long-lived perennial plant with a single woody stem (trunk) and secondary branches that reaches a height of at least 12-15 feet.
- Trees are made of wood and have branches, leaves, roots, flowers or cones, and seeds.
- Roots grow deep into the ground. They anchor the tree in the soil, and absorb water, minerals and nutrients.
- Wood is made of cells with strong cell walls that provide the structural support of the tree. The same cells are also the vascular system that transports water and sap up and down from the roots to the leaves.
- Trees grow by adding a new layer of wood every year. In a slice of a tree, these layers are called growth rings.
- Branches grow out from the trunk and support the leaves. Leaves are arranged for maximum sunlight exposure.
- Trees are covered in bark that protects the wood underneath. The bark expands and cracks as the tree grows.
- Trees reproduce by making seeds. The seed can be single or contained within a cone or fruit. Some examples of tree seeds are acorns, maple helicopters, pine nuts, walnuts, apples, and peaches.
- Like all photosynthesizing plants, trees take in carbon dioxide (CO<sub>2</sub>- what humans breathe out and release oxygen (O<sub>2</sub>- what humans breathe in).

### Types of Trees

- There are 2 basic types of trees – evergreens and deciduous
  - Evergreens keep their leaves and stay green all year. Most evergreen trees have needles and produce seeds in cones. There are also evergreen trees with leaves and those leaves are usually stiff and waxy.
  - Evergreen species – pines, fir, spruce, rhododendrons (Rhododendrons are an example of an evergreen with leaves.)
  - Deciduous trees shed their leaves at the end of the growing season. Most deciduous trees have leaves that turn color and fall off in autumn. There are a few deciduous trees that have needles.
  - Deciduous species – maple, oak, ash, birch, larch (Larch is an example of a deciduous tree with needles)



## Benefits of Trees

- Trees absorb carbon dioxide. They also absorb other gases and pollutants and remove them from the atmosphere.
- Because of their large size and longevity trees store large amounts of carbon.
- Trees release oxygen into the atmosphere that humans and wildlife need to breathe.
- Trees moderate temperature by providing shade and releasing water vapor.
- Trees anchor the soil and help to prevent erosion.
- Trees provide habitat for many different kinds of wildlife.
- Dead leaves from trees provide habitat for important decomposing and recycling organisms in soil ecosystems.
- Old growth forests are among the most diverse ecosystems in the world.
- Trees provide wood, paper, food, and medicines. Every day we use or eat many items that come from trees.
- Trees have a calming effect on most people.

## Fun Tree Facts

- About one-third of the world is covered by forests. The United States has 8% of the world's forests (750 million acres).
- The tallest living tree (and the tallest tree ever recorded) is a 379 foot tall Coast Redwood in Northern California.
- The largest living single tree is a Giant Sequoia in California with an estimated weight of 3.6 million pounds. This is more than 10 times the weight of the largest blue whale.
- Trees are among the longest lived and largest organisms in the world.
- The oldest living single tree is a Bristlecone Pine in California that is 4,800 years old.
- There is a grove of Quaking Aspen in Utah that is both larger (12 million pounds) and older (the root system is 80,000 years old) than the 2 trees listed above but this is a colony of many stems and not a single tree.

## Sources:

<http://www.epa.gov/agriculture/forestry.html#Facts%20and%20Figures>

Sibley, David. *The Sibley Guide to Trees*. New York: Alfred A. Knopf. 2009. Print.



# PRESCHOOL INTEREST AREAS PLANNING FORM

**THEME: TREE-MENDOUS TREES**

(#1-7 indicates the investigation to go to for detailed instructions)

<p><b>ART</b></p> <ul style="list-style-type: none"> <li>• Leaf rubbings</li> <li>• Bark rubbings</li> <li>• Leaf Prints</li> <li>• Fingerprint trees (#1)</li> <li>• Draw and trace leaves using different media</li> <li>• Trace a Tree (using hand) (#1)</li> <li>• Make a Leaf Melty</li> <li>• Fingerprinted Tree</li> <li>• Make a Tree (#1)</li> </ul>	<p><b>COOKING</b></p> <ul style="list-style-type: none"> <li>• “Design a Tree” snack (#1)</li> <li>• Maple sugaring – syrup for pancakes!</li> <li>• Make applesauce</li> <li>• Make fruit salad using fruit from trees (apples, peaches, pears, cherries,etc)</li> </ul>	<p><b>DISCOVERY/SCIENCE</b></p> <ul style="list-style-type: none"> <li>• Tree branches, twigs</li> <li>• Acorns, pods, etc.</li> <li>• Tree rings</li> <li>• Bark samples</li> <li>• Assorted pine needles</li> <li>• Pine Cone Weather Station (#7)</li> <li>• Assorted Leaves</li> <li>• Make a seed parachute! (#4)</li> </ul>	<p><b>DRAMATIC PLAY</b></p> <ul style="list-style-type: none"> <li>• Role play how a tree gets ready for winter (#1)</li> <li>• Using small branches and twigs, children pretend they are trees, through all seasons</li> </ul>
<p><b>ENGINEERING/DESIGN</b></p> <ul style="list-style-type: none"> <li>• Use tree cookies/natural materials to design and build</li> <li>• Use Lincoln Logs or pretzels to demonstrate building with wood (#7)</li> <li>• Grow Bonsai tree from a kit–</li> <li>• Paint bark, put together to design a new tree (#1)</li> <li>• Build a tree using a big stump for the base (#1)</li> </ul>	<p><b>LITERACY</b></p> <ul style="list-style-type: none"> <li>• See attached annotated bibliography for multiple selections</li> <li>• Use your local library as a resource.</li> </ul>	<p><b>MATHEMATICS</b></p> <ul style="list-style-type: none"> <li>• S (#7)</li> <li>• Sort and classify leaves (#2)</li> <li>• Count rings in a tree cookie</li> <li>• Identify basic shapes of trees as circles, triangles and ovals (#2)</li> <li>• Pinecone Toss Game (#4)</li> <li>• Data collection of leaves (#5)</li> </ul>	<p><b>MUSIC/MOVEMENT</b></p> <ul style="list-style-type: none"> <li>• Sway and move like a tree</li> <li>• Tree Song (#3)</li> <li>• Pretend to be a tree getting ready for winter (#2)</li> <li>• See Resource section for more song suggestions</li> <li>• Leaf raking and jumping (#5)</li> <li>• Tree aerobics (how trees are branched),</li> <li>• Yoga poses like trees (body regulation/awareness)</li> <li>• Stump jump in nature playgrounds to develop motor skills</li> </ul>
<p><b>OUTDOORS</b></p> <ul style="list-style-type: none"> <li>• Bark Protects (#1)</li> <li>• Adopt a Tree</li> <li>• Lie on the grass looking up into trees</li> <li>• Outdoor Mystery Box (#1)</li> <li>• Outdoor Memory Game (#1)</li> <li>• Classifying trees (#3)</li> </ul>	<p><b>SENSORY</b></p> <ul style="list-style-type: none"> <li>• Children use straws and water to demonstrate root systems of a tree</li> <li>• Children use branches to make trees, adding all parts from roots to crown</li> </ul>	<p><b>GAMES/ MANIPULATIVES</b></p> <ul style="list-style-type: none"> <li>• Leaf matching games (#1)</li> <li>• Tree Bingo (#1)</li> <li>• Tree and Leaf Memory games</li> <li>• Seasonal life cycle of tree cards (#5)</li> </ul>	<p><b>COMMUNITY CONNECTIONS</b></p> <ul style="list-style-type: none"> <li>• Families visit local parks, green spaces, etc. to support children’s learning.</li> <li>• Invite local arborists/landscapers to talk to the children.</li> <li>• Have a parent/family clean-up day at your school to keep trees healthy by pruning and mulching.</li> <li>• Adopt a tree in your neighborhood</li> </ul>



# INVESTIGATION SUMMARIES

**THEME: TREE-MENDOUS TREES**  
See full lessons following this form for activities and details

<b>Big Ideas</b>	<b>Investigation #1</b> What do you know or want to know about trees? Are trees living or non-living?	<b>Investigation #2</b> What are the parts of a tree?	<b>Investigation #3</b> How are trees classified? Why do some trees have leaves in the winter and some do not?	<b>Investigation #4</b> How does a tree grow? How does a tree grow pinecones or acorns?
<b>LARGE GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• KWL Chart to determine prior knowledge</li> <li>• Discussion questions.</li> </ul>	<ul style="list-style-type: none"> <li>• Parts of a tree discovery</li> <li>• Building a Tree</li> <li>• Role-play being a tree in different seasons</li> </ul>	<ul style="list-style-type: none"> <li>• Ways to classify trees</li> <li>• Deciduous vs Evergreen</li> </ul>	<ul style="list-style-type: none"> <li>• Observe an oak sapling</li> <li>• Where are the pinecone seeds?</li> </ul>
<b>SMALL GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• Tree Bingo</li> <li>• Drawing trees (mixed media)</li> <li>• Matching Games</li> <li>• Field Guides</li> </ul>	<ul style="list-style-type: none"> <li>• Bark samples</li> <li>• Re-assemble a tree</li> <li>• Create trees in sand</li> <li>• Trace-a-Tree</li> <li>• Finger-painted Tree</li> <li>• Make a tree</li> </ul>	<ul style="list-style-type: none"> <li>• Classifying Game</li> <li>• Leaf Sorting Game</li> <li>• Shape Sorting Game</li> </ul>	<ul style="list-style-type: none"> <li>• Pinecone Toss Game</li> </ul>
<b>OUTDOOR LEARNING</b>	<ul style="list-style-type: none"> <li>• Tree walks</li> <li>• Observing Trees</li> <li>• Outdoor sketching</li> </ul>	<ul style="list-style-type: none"> <li>• Mystery Box</li> <li>• Tree Memory Game</li> </ul>	<ul style="list-style-type: none"> <li>• Collection walk</li> <li>• Walk to broadly identify kinds of trees, by size, shape, leaves, bark, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Seed Parachutes to discover how far seeds travel</li> <li>• Measure how far from the tree the seeds landed</li> </ul>



## INVESTIGATION SUMMARIES - continued

<b>BIG IDEAS</b>	<b>Investigation #5</b> Why do leaves change color in the fall?	<b>Investigation #6</b> Who lives in trees?	<b>Investigation #7</b> How do trees help us?
<b>LARGE GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>- Discussion of the process of changing colors (see full lesson for two age-dependent versions)</li> <li>- Display many sizes and colors of leaves</li> <li>- Discuss how weather plays a role in changing leaf color and relate to how children adapt to each season</li> </ul>	<ul style="list-style-type: none"> <li>- Discussion questions to gather knowledge</li> <li>- Characteristics required of animals that live in trees</li> </ul>	<ul style="list-style-type: none"> <li>- Children list possibilities (food, shelter, paper and wood items, oxygen, etc)</li> <li>- Pinecone Weather Station</li> </ul>
<b>SMALL GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>- Data collection to determine timeframe for soft to crunchy leaves</li> <li>- Leaf sorting</li> <li>- Leaf art</li> <li>- Leaf rubbings</li> <li>- Leaf Melty</li> </ul>	<ul style="list-style-type: none"> <li>- Individually or in pairs, children explore nests, pieces of bark, twigs for possible animal homes</li> </ul>	<ul style="list-style-type: none"> <li>- Torn Paper Tree</li> <li>- Design (small group working in pairs) and build houses from Lincoln Logs or any type of building blocks. Share ideas with friends.</li> </ul>
<b>OUTDOOR LEARNING</b>	<ul style="list-style-type: none"> <li>- Fall leaf collecting</li> <li>- Leaf raking and jumping</li> </ul>	<ul style="list-style-type: none"> <li>- Search for animal homes in trees during an outdoor walk</li> <li>- Take photos for classroom display</li> </ul>	<ul style="list-style-type: none"> <li>- Adopt a Tree</li> </ul>



# Introduction to trees

What do you know or want to know about trees?

Are trees living or non-living?

What do you like best about trees?

What do you think is beautiful about trees?

Why do people like to have trees in their yards and parks?

## LARGE GROUP LEARNING ACTIVITIES

Teacher scribes on a K-W-L chart as students orally describe their own background experiences, knowledge or observation of trees, vocabulary, characteristics, etc. For example:

What do we KNOW?	What do we WANT to know?	What did we LEARN?
Trees are green	How old are trees?	Some trees do not lose their leaves
Birds live in trees	Are trees alive? Do they grow?	Some food comes from trees
I have trees in my yard and in the park	Why do they fall over?	Trees are home for many creatures.

**Trees are an important part of our world.** They provide wood for building and pulp for making paper. They provide habitats (homes) for all sorts of insects, birds and other animals. Many types of fruits and nuts come from trees -- including apples, oranges, walnuts, pears and peaches. Even the sap of trees is useful as food for insects and for making maple syrup!

**Trees help to keep our air clean and our ecosystems healthy.** We breathe in oxygen and breathe out carbon dioxide. Trees breathe in carbon dioxide and breathe out oxygen. We're perfect partners!

**Trees do lots for us, our environment, and other plants.** But we don't just love trees for practical reasons. Trees can also be very beautiful -- tall enough they seem to touch the sky and so big around you can't even hug them.

**The way a tree grows through different seasons can be seen by growth rings in the wood, they can even be used to determine the age of a tree.**

**Read:** Recommended *A Tree is Nice* or *A Grand Old Tree* (see Bibliography)

## SMALL GROUP LEARNING ACTIVITIES

**Tree Bingo Game** – to help children understand shape, sizes and kinds of trees  
Can be made (see sample in Resources section)



- Children receive laminated Bingo cards with pictures of trees found in your community – three across and three down
- Smaller cards (to fit squares on Bingo card) with same photos are cut and laminated
- Students take turns to match small card to those on Bingo card
- Goal is to get three photos vertically, horizontally or diagonally or simply to match them all
- Consider the development of the children playing as they may simply want to match their card with the template. The goal is to become familiar with various types of trees. Children often get caught up with size and color, so you may need to do them in black and white and focus on the SHAPE of the tree.

**Observe trees.** Lie on your back under one or more trees. Talk about how trees are different from each other. Lie and listen for sounds. Watch for birds and wind blowing in the needles/leaves.

Sitting outside, children use any media to **draw/design/sketch their own tree.**

**Bark rubbings** work well to distinguish between thickness and texture of bark

**Drawing activity** where children use any media to draw/design/sketch their own tree.

**Matching games** – use laminated photos of many trees

**Field guides** – have simple guides available for children (see Bibliography for suggestions)

## OUTDOOR LEARNING ACTIVITIES

### Tree walks

- Students track how many trees and varieties of trees they see. They do not need to identify them by name. They often will come up with their own name for a tree, such as “shaggy” tree or “grey bark” tree
- Can they count them? Broadly classify them?
- How many different colors do they notice? Sizes and types of leaves?
- Note types of barks, thickness of trunk and branches, height, etc.



# What are the parts of a tree?

## LARGE GROUP LEARNING ACTIVITIES

### Parts of a Tree:

- **Seed:** Like many plants, a tree begins from a seed. Inside each tree seed is a tree waiting to be born! A seed must have food, water and sunlight to grow. Once the seed sprouts, it grows into a seedling that grows into a sapling and eventually saplings grow into trees that produce their own seeds.
- **Roots:** The roots are the part of the tree that grows underground. Trees have a lot of roots -- the size of the root system is usually as big as the part of the tree above the ground. This is necessary because the roots help support the tree. It takes a lot of roots to hold up a 100 foot tree! Besides keeping the tree from tipping over, the main job of the roots is to collect water and nutrients from the soil and to store them for times when there isn't as much available.
- **Crown:** The crown is made up of the leaves and branches at the top of a tree. The crown shades the roots, collects energy from the sun (photosynthesis) and allows the tree to remove extra water to keep it cool (transpiration -- similar to sweating in animals). The crowns of trees come in many shapes and sizes!
- **Leaves:** Leaves are the part of the crown of a tree. They are the part of the tree that converts energy into food (sugar). Leaves are the food factories of a tree. They contain a very special substance called chlorophyll -- it is chlorophyll that gives leaves their green color. Chlorophyll is an extremely important biomolecule, used in photosynthesis -- leaves use the sun's energy to convert carbon dioxide from the atmosphere and water from the soil into sugar and oxygen. The sugar, which is the tree's food, is either used or stored in the branches, trunk and roots. The oxygen is released back into the atmosphere.
- **Branches:** The branches provide the support to distribute the leaves efficiently for the type of tree and the environment. They also serve as conduits for water and nutrients and as storage for extra sugar.
- **Trunk:** The trunk of the tree provides its shape and support and holds up the crown. The trunk transports water and nutrients from the soil and sugar from the leaves.
- **Bark:** The outside layer of the trunk, branches and twigs of trees. The bark serves as a protective layer for the more delicate inside wood of the tree. Trees actually have inner bark and outer bark -- the inner layer of bark is made up of living cells and the outer layer is made of dead cells, sort of like our fingernails

**Building a Tree (indoors):** As you talk about each part, the children will get a chance to help "build" the tree. Using a flannel board or poster board drawing of a tree, the children place the various materials on the correct part of the tree. Children can also do a "live" demonstration of building a tree using each other as models.

- Start by planting the seed. It will produce roots and grows into a sapling.
- The roots are under the ground and bring water and food to all parts of a tree. (Bring it around the circle for everyone to touch -- feel the hairs on your palm, do they tickle?). What do you notice about the roots? Point out the tiny little hairs. Roots act like little straws. They work all year long and store food for the winter.



Pretend you are a root, just like a straw sipping up all the water and food to help you grow. The roots also help the tree to stay strong in the ground. They grow long and wide. Spreading out under the earth. If a big wind blows the tree, usually it won't fall down because the roots keep it strong in the ground. Have the children place their feet strong and wide. A few students are chosen to place the roots (big straws and little straws).

- The trunk stands tall and has something like a hose inside that carries food from the roots to the trunk and the branches/leaves. And another hose that takes the food from the leaves to the rest of the tree. A few students are chosen to place the tubes.
- Do you remember what the bark is for? (to protect the tree from cold, hot, insects, disease) A few students are chosen to place the bark on top of the tubes.
- The crown of the tree includes the branches, limbs, flowers, fruit and the leaves. It's like a crown that a queen/king might put on top of their head.
- The branches are connected to the trunk. The branches help carry the food/water from the roots to the leaves and from the leaves to the roots. A few students place the branches and leaves. Point out the veins and stems of the leaves and compare to their veins

### **Pretend to be a tree getting ready for winter:**

- Just like the parts of your body are connected to another part so are the parts of a tree. Imagine your hands are leaves and your arms are branches. Which part of you is the trunk? How about the roots?
- Starting from the roots to the crown, verbalize each part of the tree. Children stand up and pretend they are trees acting out as you describe the parts.
- Wiggle your toes. These are your roots. Suck up the water, and nutrients from the soil up to your trunk, branches and leaves. A big wind comes, hang on and spread

your roots (legs) wide to make you strong against the wind. Feel the food from the roots travel through the trunk (tubes) to your branches and leaves. Your leaves are producing food from the sun. Feel the food from the leaves travel through your branches down to your trunk and roots. Now Fall comes, your leaves fall off, shake them off. The earth near your roots freezes, you have little or no food. You start to sleep. If you need a little food you remember to store some in your roots. Take a little food from your roots, sip it through your straw. Now sleep again. Your bark protects you from the cold. Give yourself a warm hug – feel your bark.

- Add a story from Project Learning Tree (see resources) where children pretend to be a tree during a storm, a quiet period or a tree with an animal crawling up its bark.

### **SMALL GROUP LEARNING ACTIVITIES**

Place samples of bark from many different trees on the table. Children match them to other sample textures. For example, match a rough bark to a rock, a smooth bark to a piece of cloth, a bumpy bark to a textured block from the design/engineering play center, etc. Children practice vocabulary while matching the bark.

Make parts of a tree available on laminated cards, a felt board, etc. for children to assemble as they say the names of the parts

Use a branch to form parts of the tree in a sand area outdoors or sand/salt placed in a deep baking pan indoors.

**Trace a Tree:** From <http://littlegiraffes.com/teaching-ideas/307/happy-fall-activities-ideas-for-autumn/>

- You'll need: construction paper, tissue pieces of various colors, glue and scissors.
- Trace a child's arm and hand to make a fall tree. Child glues torn colored tissue pieces on for the leaves.



## Use your fingers to create this easy apple or cherry tree

- Stamp the side of your hand in brown paint and stamp it on the paper as the trunk.
- Stamp your index finger in green paint and stamp it many times on the paper for the leaves (re-dipping in the paint as necessary)
- Stamp your pinkie finger in red paint and stamp it lightly on the paper for the apples (light stamps make rounder prints)

## Build (and eat) a Pretzel and Grape tree snack!

### Make a tree:

- Supplies: Cardboard tubes from paper towels, green and brown paint, cotton balls, brown yarn, scissors, glue, hole punch
- Children paint the “trunk” (tube)
- Using scissors go around one end of the tube cutting into it at different lengths. These will drape or fold out to form branches.
- Children glue cotton balls to the branches and dab with green paint
- Punch holes around base of tree. Have children insert different lengths of yarn and help knot them (roots).

## OUTDOOR LEARNING ACTIVITIES

### Mystery Box: (inside is a piece of bark)

I have a mystery box. Inside this box is something that reminds me of the forest. You are going to put your hand in the box, feel, drop the item and pull your hand out. When you are feeling the item, think about what it might be BUT don't say anything. How does it feel? Round, flat? Rough, soft? Keep it in your head. When everyone has a turn to touch it, then you can raise your hand and tell us what you think it might be.

I remind each child to “keep it in your head, tell me later” when it is his/her turn. When everyone has had a turn to guess...pull it out. It's bark! On what part of the tree do we see the bark? It's on the biggest part of the tree, the trunk. Here is another piece of bark (birch). How does this piece

of bark feel? I will pass it around. It also could be an acorn, twig, etc.

How do you think the bark protects the tree? It protects it from the very hot or very cold weather, insects, and disease. Some insects are able to get inside the bark and may destroy the tree. But the bark can help stop most insects.

Walk to find different kinds of bark. Feel it, describe it. Does it feel like the bark in the mystery box?

**Tree memory game:** Invite students to get to know trees by touch and smell, using all of their senses other than sight. Taking turns with each student, place a blindfold or ask them to close their eyes as you gently and safely guide them to a tree. A large paper grocery bag also works well as it lets the light in but doesn't allow children to see the object. Try to use a spot where there is a grove of trees standing together. Ask each child to reach out and touch the tree that you've led them to, getting a feel for the size of its trunk and texture of its bark and any other non-visual cues they can discover. Then gently lead them away, turn them around once or twice. Finally, remove the blindfold or ask them to open their eyes and challenge them to locate 'their' tree, either by touch or by sight if they can!

### The Bark as protection

- Start with a large log as the base.
- Using chicken wire, tie pieces of bark on, as you talk about the layers of protection for the tree
- Add birds, twigs, leaves, etc. as you move forward with the unit



# How are trees classified or grouped? Why do some trees have leaves in the winter and some do not?

## LARGE GROUP LEARNING ACTIVITIES

There are many ways to group or classify trees.

We can group them by size.

- Big and tall
- Small and short

We can group them by age – young or old

We can group them by the kind of leaves they have.

- Broad leaves (maple, oak, elm, etc.) have large surfaces to gather a lot of sunlight. Because of the large surface they also lose a lot of water by evaporation.
- Needles - They are long and thin. This shape slows down the evaporation of water so the tree doesn't lose as much water. Because of this adaptation, trees with needles often don't need as much water and can grow in areas that other trees can't.
- You can also group trees by how they lose their leaves.
- Many trees lose their leaves when the weather gets cool. On these trees, the leaves fall to the ground all at once and grow back again when the weather gets warmer. Many trees with broad leaves do this. We call them deciduous trees. Do you see any of these trees outside our window?

Other trees have leaves or needles that fall off a little at a time. These types of trees are always growing new leaves. As the old ones fall off, they are replaced with new leaves. We call these trees evergreens. A healthy evergreen tree is never completely without leaves.



## SMALL GROUP LEARNING ACTIVITIES

Set up a station with groups of cards representing deciduous and evergreen trees (laminated if possible). Children will divide or separate them into two columns marked DECIDUOUS and EVERGREEN (with sample photos or drawings to help).

Using the same strategy, students will separate groups of leaves and needles into the same two categories.

Children use basic shapes of a circle, oval or triangle to categorize basic shapes of trees. Children will sort tree cards by shape.

## OUTDOOR LEARNING ACTIVITIES

Leaf collection walk: Take a walk to collect as many kinds of leaves and needles as possible for the discover center.

On an outdoor walk, give each child a shape card (circle, oval, triangle, etc) to locate leaves that match the shape.



Laminate various leaves in clear contact paper. Stop at different trees for children to examine their leaf with the ones on that tree.

On an outdoor walk, children use a clipboard and tally marks (simple lines, or Xs) to identify types of trees they find



# How does a tree grow? How does a tree make pinecones or acorns?

## LARGE GROUP LEARNING ACTIVITIES

### Observe an Oak Sapling:

I have something behind my back that will grow very big some day. Bigger than this Nature Center or school, bigger than your house. What do you think it is? This is something that is getting ready to sleep for the winter. Show them. What do you think this might be? Take several responses. It is an oak sapling, It is a small tree. If I return it to the ground it will grow into a big tree. There are many different parts to trees. What parts do you see?

### Where are the pinecone seeds?

Trees that grow cones are in a group called conifers. The cones of the conifers are very important because they are the place where the tree makes and shelters its seeds. Cones are made up of many scales. Scales are a kind of shelter for the seed. When it's time, the scales of the cone open and the seeds fall to the ground.

Read *Oak Inside the Acorn* (see bibliography)

## SMALL GROUP LEARNING ACTIVITIES

**Pinecone Toss Game** (Math) Play outdoors if the weather is nice or inside if it's not. [www.toddlerapproved.com/2012/09/fall-pine-cone-toss-simple-counting-game.html](http://www.toddlerapproved.com/2012/09/fall-pine-cone-toss-simple-counting-game.html)

- Place three plastic bowls out in order from big to small (small is harder and further away) and designate each bowl to have a certain number of points. Keep it simple and have the big bowl be worth 1 point, next bowl worth 2 points, and third (harder) bowl worth 3 points.
- Child sits or kneels behind the designated line.
- Child rolls the die and says/counts the number shown.
- Toss that number of pinecones into the bowls to try and earn the most points.
- Children will soon discover that throwing three into the furthest small bowl will earn more points than throwing all three into the first big bowl.

## OUTDOOR LEARNING ACTIVITIES

Gather and classify seeds, using a stopwatch to see how long it takes for each to hit the ground. Children can then act out how the seed moves as it falls to the ground.



Make a seed parachute to demonstrate how seeds travel to grow more trees!

- Encourage students to explore the aerial transport and dispersal of seeds from large trees so they can understand some of the ingenious ways a tree uses its height and the wind to spread its seeds. Seeds from a tree can be carried far and wide by even a gentle breeze.
- Gather seeds from the pods of any local tree. Examine the helicopter wing structure of ‘whirly-gig’ spinning seeds built for transport.
- You’ll need: as many seeds as you can collect, Pringles potato chip can, plastic or cardboard hole punch, scissors, kitchen twine.
- Cut the base out of the Pringles can.
- Punch two holes into the sides near the base of the can so that you can feed twine through and hang the can upside down.
- Remove the serving cap at the top of the can and punch a hole in its center.
- Cut a length of twine and feed it through the hole in the cap, tie a stop knot at its end so that the twine ‘rip cord’ will pop the cap off with a swift tug from below.
- Now snap the cap back on the can and holding it upside down, pour seeds into the open base, filling it up to the brim with seeds.
- Hang your seed parachute from a tree or as high a spot as you can safely secure it to.
- When it is securely placed, have a student pull the rip cord. If you have enough to make more than one, have students pull the cords in unison for an even larger explosion.

**Extensions** – Do more: using a stopwatch, time how long it takes for all of the seeds to reach the ground from the moment the rip cord was pulled. Have students search the ground around the circle from where the seeds landed. Measure the farthest distances that any seeds flew from the source.



# Why do leaves change color in the fall?

## LARGE GROUP LEARNING ACTIVITIES

Leaves changing color is a process that needs to be simplified for the developmental level of the child. Below you will find two ways to present this idea to children.

Like us, trees need to eat to grow. In fact, they like to eat sugar — a type of sugar they make with the help of the sun and a green chemical called chlorophyll. We can tell they're eating because chlorophyll is making the leaves green. Trees eat (and grow) the most during spring and summer, when there is the most sun. In the fall, trees slow down to rest, just like animals hibernate. Luckily, they've made and stored enough food to stop their work. Since they are no longer eating, the green goes away, leaving the fall colors that had been there all along.

Trees are busy during Spring and Summer soaking up sun, water and oxygen. They use these three items to make their own food and to make Chlorophyll. The Chlorophyll coats their leaves with green, all Spring and Summer. In the fall, the weather changes; the days are shorter with less sunshine and the days are dryer with less water. Soon the tree does not have enough sun and water to make both its food and Chlorophyll, so it stops making Chlorophyll and the leaves return to its natural color. What do you notice about leaves in the fall? Yes, they fall off. Why do they fall off? They can't help the tree make food. There is not enough sun. If the leaves stayed on the tree they would get icy and heavy and may break the branches, damaging the tree. The trees store some of their food in the roots and save it for when they need it in the winter. The tree needs to go to sleep for the winter, just like animals.



## SMALL GROUP LEARNING ACTIVITIES

Math/ELA/Science: How many days does it take for different kinds of leaves to turn CRUNCHY? Go outside and gather a bag full of leaves. Seal them in a baggy at first to keep them from drying out too quickly.

- As young children observe the changes, you can help them build new vocabulary and record their observations.
- These leaves have been off of the tree for 1 day. The leaves are soft and pliable.
- After 2 days, they are starting to curl up around the edges.
- After 3 days, they are starting to get dry and stiff.
- After 4 days or more, they are starting to turn brown and crunchy.
- Children can compare data of different kinds of leaves.
- Sort a collection of leaves by size, shape and color and texture (as described above).

Place groups of leaves in different stages in containers for **leaf art**.

**Leaf rubbings:** Put the leaf underneath the paper so the rough (back) of the leaf is facing up. Take a crayon and peel off the paper. Lie the crayon on its side and rub it over the template



**Make a Leaf Melty:** Make fall leaves from grated crayon melted between layers of wax paper and cut into leaf shapes.

- Try several different crayon colors across the wax paper, mixing some and isolating others.
- Grate crayon on one sheet of wax paper, cover with other half.
- Iron on medium low temp, just enough to melt the crayons and layers of wax paper together.
- Let it cool, trace your leaf shape and cut out.
- Thread them with string, tape up in a window.

Cut Four Seasons of a Tree template in resource section to make a sequence game.

## OUTDOOR LEARNING ACTIVITIES

During the summer when there is a lot of sun, the green helps the sunlight to make the tree's food. But in the fall and winter, they stop making food. Because there is not as much sun, the green doesn't need to show and the other colors show on the leaf and the leaves fall off. Leaves are important because they make the tree's food with sunlight and water. What colors do you see? Can you point to a red leaf, how about a yellow one? Let's go collect some? How many different shapes and colors can you find?

Children rake leaves in piles, then practice jumping over the piles using a one footed leap and a two-footed jump.



# Who lives in trees?

Do you know who lives in trees?

Why don't we live in trees?

What are some physical characteristics animals need to live in trees?

## LARGE GROUP LEARNING ACTIVITIES:

There are many animals that build their houses in trees. Let's see how many we can name.

Animals need a place to live just as we do. Some live in the water and others in holes in the ground, but many animals live in trees. We cannot live in trees because we do not have the special characteristics that are needed to move about in trees. If we were to take away trees, we would leave many animals without homes. Animals have special characteristics that help them use the trees as their home.

**Claws:** Many animals have claws that grip to the trees. Squirrels build their nests (called dreys) high up on the treetops, or in the tree's canopy. They have small claws on their feet that help them hold on to tree trunks and branches, even upside-down! Birds have claws to help them hold on and balance on tree branches.

Read *Who Lives In A Tree?*

## SMALL GROUP LEARNING ACTIVITIES

Children make animal homes (for tree-loving animals) in shoeboxes using natural materials and being sure to provide food, water, shelter and air. Make use of existing tree cavities you may have found on your walks to demonstrate the concept of a shelter.

## OUTDOOR LEARNING ACTIVITIES

Animal homes scavenger hunt (in trees) – have children look for holes in trees, nests (big and small), spider webs, etc.

Look for holes and relate to how birds make homes in tree cavities

**Rotting logs:** children can use tweezers to pick apart a rotting log and discover many, many insects that need this log to survive! Relate logs to their homes by using words such as apartment, roof, basement, etc. Reinforce how important it is to “put the roof back on” when the activity is finished.

Search high in trees for dreys (squirrel nests). They are the large ones up high in a tree.



# How do trees help us?

## LARGE GROUP LEARNING ACTIVITIES

- Trees are important. Can you think of some things we get from trees?
- They provide wood for building and pulp for making paper.
- They provide habitats (homes) for all sorts of insects, birds and other animals.
- Many types of fruits and nuts come from trees – can you name some? (apples, oranges, walnuts, pears, peaches, etc.)
- Even the sap of trees is useful as food for insects and for making maple syrup!
- Trees also help to keep our air clean and our ecosystems healthy. We breathe in oxygen and breathe out carbon dioxide. Trees breathe in carbon dioxide and breathe out oxygen.
- Wood from trees can be used in a number of different ways including as a building material and energy source (such as a campfire).
- Trees prevent soil erosion, that is to protect the upper layer of the soil from drifting away by wind and water.
- Trees are the homes of many animals and help provide the shelter and food for them and many plants. Can you name some animals that live and need trees?
- A tree gives shade in the summer and keeps us cool.
- Talk a “room walk” and identify everything that is made from trees.

### **Pinecone Weather Station:**

([www.science-sparks.com/2012/08/13/pine-cone-weather-station/](http://www.science-sparks.com/2012/08/13/pine-cone-weather-station/))

Students set up a pinecone weather station to predict what the weather will be like.

Collect some pinecones with children while on a walk.

Set them up on a window sill or shelf outside that can be observed from inside so the students can record what is going on with the pine cones each day. It's a good idea to attach them to the shelf or sill with some blu-tack or modeling clay so they don't fall over.

When the weather is dry, the pinecones open up and when it's going to rain, they close down. It's a really fun way for children to start to think about what the weather will be doing.

Why does it work? Pinecones open and close depending on the humidity to help seed dispersal. Inside the pinecone there are lots of feather light seeds. When it is dry, the pinecone opens; wind will catch the seeds, allowing them to be dispersed far away from the original tree. When humidity rises, pine cones close up to prevent seeds escaping as they would become water logged and travel only a short distance from the original tree – to be shaded out by the “parent” competing for resources.



## SMALL GROUP LEARNING ACTIVITIES

Torn Paper Tree: children tear scraps of paper to create a tree of their own design.

Lincoln logs: Children design and build house, furniture and other items out of wood.

Children use pretzels (as wood) to design and shape something made from wood.

Children make a fruit salad from fruits that grow on trees. Families can participate by bringing in a particular fruit and a picture of the tree it came from. Just be careful of ALLERGIES!

Children make applesauce – many simple recipes available on-line

## OUTDOOR LEARNING ACTIVITIES

### **Make a Special Friend** (adopt a tree)

Invite students to choose and get to know one tree near the school as a special friend. Take a photograph of each student with his/her tree to post in the classroom. Help students learn what kind of tree it is and how it changes from season to season. Measure the circumference of your tree. Are there ways we can help a tree stay healthy? (e.g., by watering, protecting against damage from lawn mowers, carving, breaking branches, etc.) .Visit the tree periodically and watch for changes.

**Maple sugaring:** tap a maple tree in spring, collect sap, boil down to make syrup and then make pancakes. Include taste tests of different stages of sap to syrup and then compare to bottled syrup

On warm days, children eat lunch, have a snack or listen to a story under the shade of a tree



## Possible extensions for this unit:

-  Go to a local wildlife sanctuary or wildlife rehabilitation center for a program with a naturalist or rehabilitator
-  Keep a list of trees you see year round in your schoolyard or community and observe the seasonal changes
-  Plant a tree and care for it.
-  Invite a local gardener or landscape company to visit



## CHILDREN'S BIBLIOGRAPHY

# RESOURCES:TREES

Title	Author	Description
<b><i>A Grand Old Tree</i></b>	Mary Newell De-Palma	Once there was a grand old tree, whose roots sank deep into the earth and whose arms reached high into the sky. Every spring the grand old tree flowered and bore cherries for the squirrels and birds that made their homes in her leafy branches. And every year, seeds from the tree scattered in the wind, along with many millions of leaves.
<b><i>A Tree for Emmy</i></b>	Mary Ann Rodman	Emmy loves trees, but her favorite is a mimosa tree in her Gramma's pasture. She loves swinging on its branches, playing with its fuzzy pink blossoms, and shaking its seed pods like maracas. For her birthday Emmy wants a mimosa tree of her own, but she's disappointed to find that none of the local garden stores sell wild trees
<b><i>A Tree Is A Plant</i></b>	Clyde Robert Bulla	A tree is the biggest plant that grows. Trees can live for a very long time, and they are alive all year long, even when they look dead in winter.
<b><i>A Tree is Growing</i></b>	Arthur Dorros	A picture book introduction to trees follows the growth of an oak tree over the course of a year.
<b><i>A Tree is Nice</i></b>	Janice Udry	Trees are beautiful. They fill up the sky. If you have a tree, you can climb up its trunk, roll in its leaves, or hang a swing from one of its limbs. Birds can make nests in the branches. A tree is nice.
<b><i>Animals That Live in Trees</i></b>	Jane McCauley	Introduces a variety of animals, such as koala, fruit bat, walkingstick, snail, and howler monkey, that seek safety, food, and shelter in trees.
<b><i>Be A Friend to Trees</i></b>	Patricia Lauber	Trees are a valuable natural resource. People depend on trees for food, and animals depend on trees for food and shelter. We must protect them because we can't live without them.
<b><i>Busy Tree</i></b>	Jennifer Ward	Introduce young readers to the amazing activities that go on in a tree. Acorns nibbled by chipmunks, ants scurrying across a trunk, a spider spinning a web. Everything adds up to a "busy tree".
<b><i>Can You Find These Trees?</i></b>	Carmen Bredeson	Learn how to identify many common trees by reading about their traits and seeing photos of the trees and leaves in nature.



<b><i>Chick Pea and the Changing Trees: A Pull-the-Tab Book about the Seasons</i></b>	Linda Cole Design Ltd.	Join Chick Pea and his bluebird friend Sweet Pea as they learn about the changing seasons.
<b><i>Fall of Freddie the Leaf</i></b>	Leo Buscaglia	This is a story of How Freddie and his companion leaves change with the passing seasons, finally falling to the ground with winter's snow, is an inspiring allegory illustrating the delicate balance in nature.
<b><i>I Can Name 50 Trees Today!: All About Trees (Cat in the Hat's Learning Library Series)</i></b>	Bonnie Worth	While stopping to admire some of the world's most amazing trees, the Cat and Co. teach beginning readers how to identify different species from the shape of their crowns, leaves, lobes, seeds, bark, and fruit.
<b><i>In My Tree</i></b>	Sara Gillingham and Lorena Siminovich	Turn the colorful die-cut pages of this irresistible board book to discover just what makes little owl's tree so cozy.
<b><i>Leaves, Leaves, Leaves</i></b>	Nancy Wallace	Join Mama and Buddy Bear's stroll through the seasons as they examine the development of leaves on their favorite trees. In early spring, Buddy wonders when the leaves will emerge from their buds and blossom into the wonderful shapes he and Mama like to collect in the summer months.
<b><i>Seasons of Arnold's Apple Tree</i></b>	Gail Gibbons	Arnold collects apple blossoms in spring, builds a tree house in summer, makes apple pie and cider in the fall, and hangs strings of popcorn and berries for the birds in winter, among other seasonal activities.
<b><i>Tap the Magic Tree</i></b>	Christie Matheson	It begins with a bare brown tree. But tap that tree, turn the page, and one bright green leaf has sprouted! Tap again—one, two, three, four—and four more leaves have grown on the next page.
<b><i>Tell Me, Tree: All about Trees for Kids</i></b>	Gail Gibbons	Featuring a special section on how children can make a tree identification book of their own, this title is a bright and colorful introduction to trees, leaves, and their inner workings in nature.
<b><i>The Apple Orchard Riddle</i></b>	Margaret McNamara	In this child-friendly classroom story, the students learn a lot about apples and apple orchards—including how apples are harvested, how cider is made, and what the different varieties of apples are—while trying to solve a riddle.



<b><i>The Apple Tree Pie</i></b>	Zoe Hall	Two sisters rejoice as the colorful blossoms on their tree develop into big, red, and ready-to-pick apples. This concept book about how things grow includes an easy recipe for apple pie.
<b><i>The Leaf Man</i></b>	Lois Ehlert	Fall has come, the wind is gusting, and Leaf Man is on the move. Is he drifting east, over the marsh and ducks and geese? Or is he heading west, above the orchards, prairie meadows, and spotted cows? No one's quite sure, but this much is certain: A Leaf Man's got to go where the wind blows.
<b><i>The Oak Inside the Acorn</i></b>	Max Lucado	It was hard for Little Acorn to believe he would ever be a big, strong oak tree. Soon Little Acorn grew into Little Oak. But now what was he to do? He just grew and grew until he became Big Oak, and his branches were big and strong-but still he didn't know what he was to do. Then one day Big Oak found that his strong branches were just right for a very special purpose.
<b><i>This Tree Counts!</i></b>	Alison Formento	If you listen carefully to the lone tree behind Oak Lane School, it has a story to tell, about... one owl, two spiders, three squirrels, four robins, five caterpillars, six ants, seven crickets, eight flies, nine ladybugs, and ten earthworms. What does this tree need?
<b><i>We're Going On a Leaf Hunt</i></b>	Metzger	There are lots of beautiful fall leaves to find! Three friends have a big adventure hiking over a mountain and through a forest to collect leaves of all kinds and colors. What will they do with all their leaves at the end of the story?
<b><i>Who Lives in a Tree</i></b>	Susan Canizares	Photographs and simple text depict the many different animals that live in trees, from the roots to the branches.
<b><i>Why Do Leaves Change Color?</i></b>	Betsy Maestro	As children jump into piles of leaves and help their parents rake the yard, they also wonder: Why do leaves change color? This book includes detailed pictures of leaves in different sizes, shapes, and colors and a list of activities that kids can do with leaves.



## FINGERPLAYS

### The Apple Tree

Way up high in the apple tree,  
Five red apples looked at me.  
*Point up high  
Hold up five  
fingers*

I shook that tree as hard as I could,  
*Pretend to shake  
the tree with  
both hands*

Down came an apple,  
*Wiggle fingers  
down from the air*

Mmmm, it was good.  
*Rub tummy!*

Repeat with four, three, two, and one apple “smiled at me.”

### Five Little Squirrels

Five little squirrels with acorns to store. One went to sleep and then there were four!  
Four little squirrels hunting acorns in a tree. One fell down, and now there are three!  
Three little squirrels wondering what to do. One got lost, and now there are two!  
Two little squirrels tossing acorns for fun. One got tired, and now there is one!  
One little squirrel playing in the sun. He ran away, now there are none.

## POEMS

### The Beech Tree by Rose Fyleman

I'd like to have a garden  
With a beech tree on the lawn;  
The little birds that lived there  
Would wake me up at dawn.  
And in the summer weather  
When all the leaves were green,  
I'd sit beneath the beech boughs  
And see the sky between.

### Trees, trees, trees

Trees, trees, trees  
Have roots, and trunks, and leaves,  
Trees, trees, trees,  
Have buds, and fruits, and seeds,  
Trees, trees, trees,  
A home for birds and bees,  
We all need our trees, trees, trees...

### Every Time I Climb a Tree by David McCord

Every time I climb a tree  
I scrape a leg  
Or skin a knee  
And every time I climb a tree  
I find some ants  
Or dodge a bee  
And get the ants  
All over me  
And every time I climb a tree  
Where have you been?  
They say to me  
But don't they know that I am free  
Every time I climb a tree?  
I like it best  
To spot a nest  
That has an egg  
Or maybe three  
And then I skin  
The other leg  
But every time I climb a tree  
I see a lot of things to see  
Swallows rooftops and TV  
And all the fields and farms there be  
Every time I climb a tree  
Though climbing may be good for ants  
It isn't awfully good for pants  
But still it's pretty good for me  
Every time I climb a tree



## **A Squirrel Song (Tune: “She’ll Be Coming Round the Mountain”)**

I’ll be gathering all the acorns till they’re gone.

I’ll be gathering all the acorns till they’re gone.

I’ll be gathering all the acorns, gathering all the acorns,

Gathering all the acorns till they’re gone. (*Children make collecting motion with their hands*)

I will put them all inside my little home.

I will put them all inside my little home.

I will put them all inside, put them all inside,

Put them all inside my little home. (*children pretend to place nuts in tree house*)

I will eat the nuts until the winter’s gone.

I will eat the nuts until the winter’s gone.

I will eat the nuts until, eat the nuts until,

Eat the nuts until the winter’s gone. (*children pretend to eat acorns*)

Then I’ll do it all again come next fall.

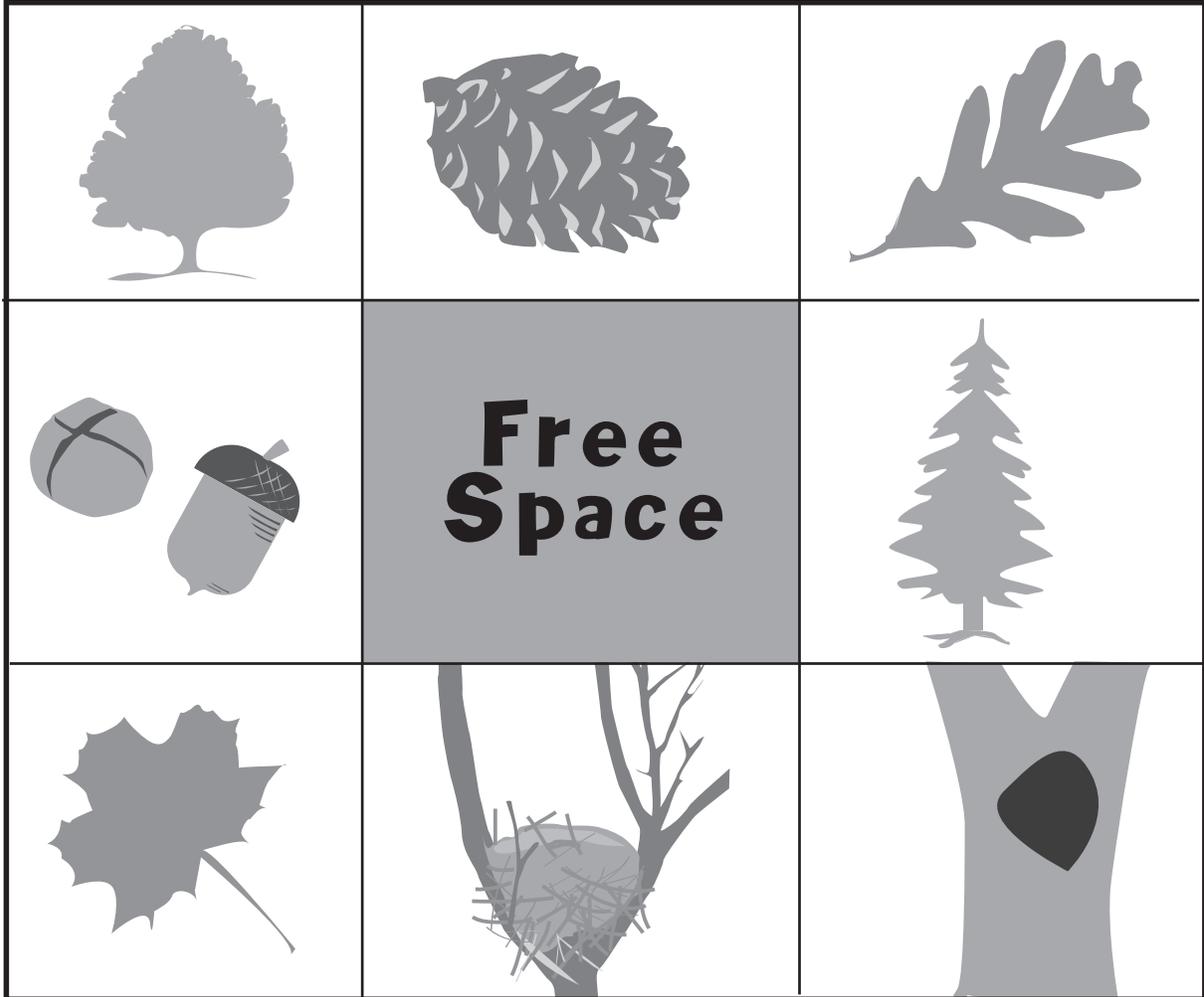
I will do it all again come next fall.

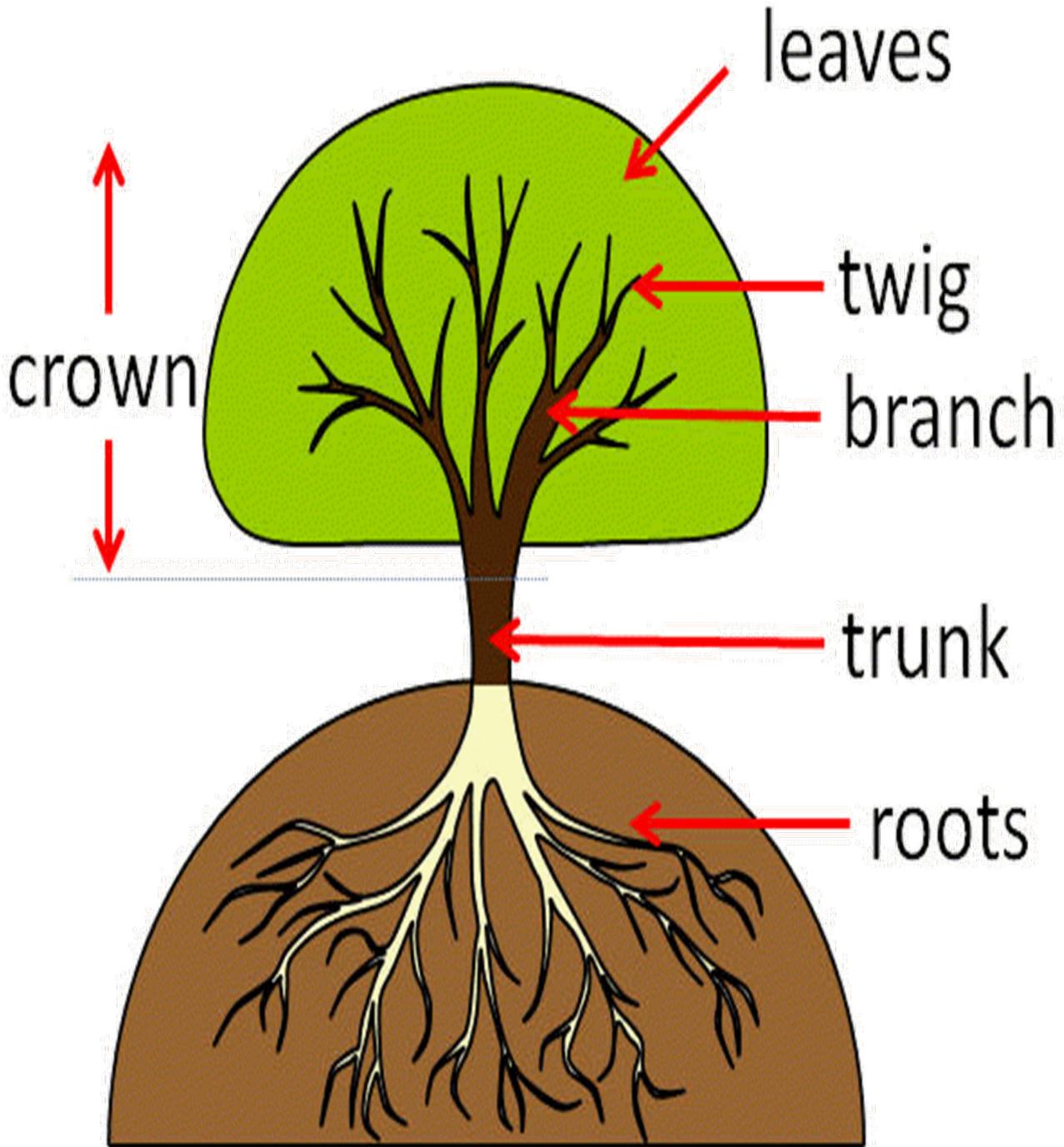
I will do it all again, do it all again,

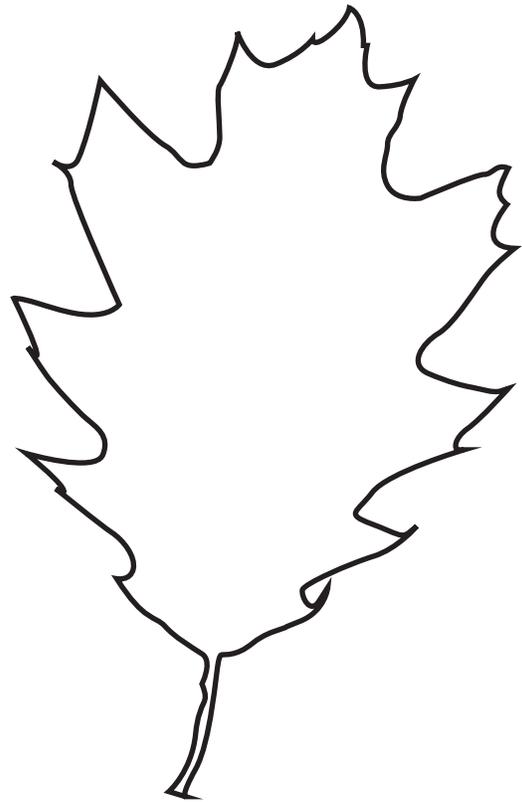
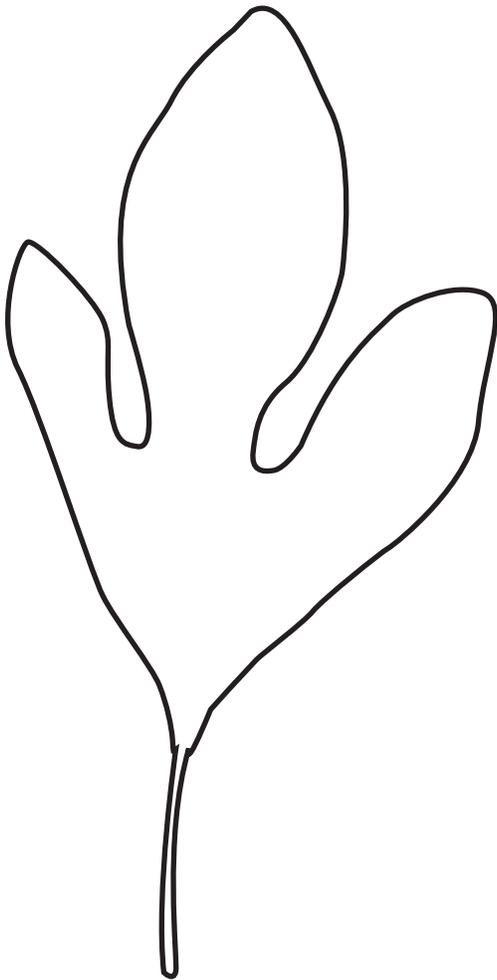
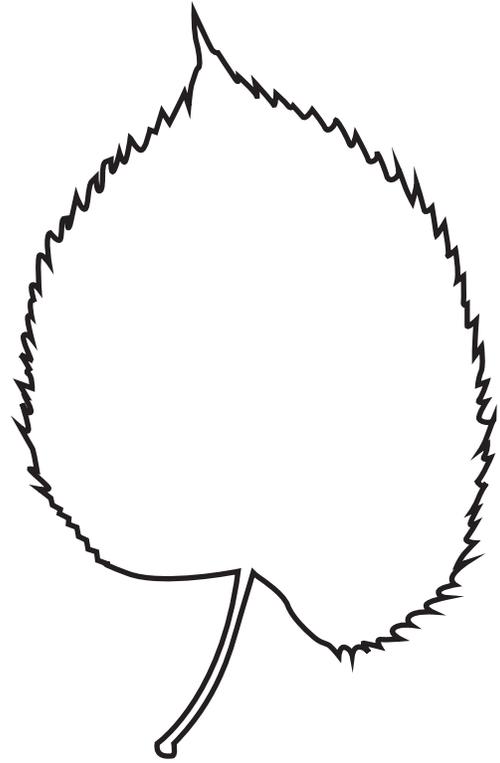
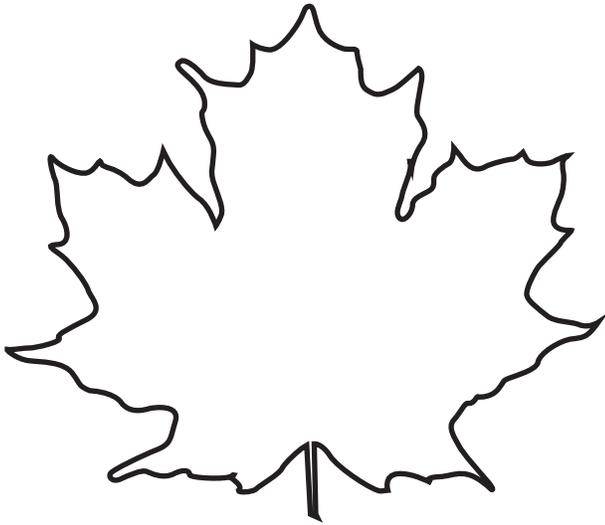
Do it all again come next fall. (*children make gathering motion with hands and arms again*)

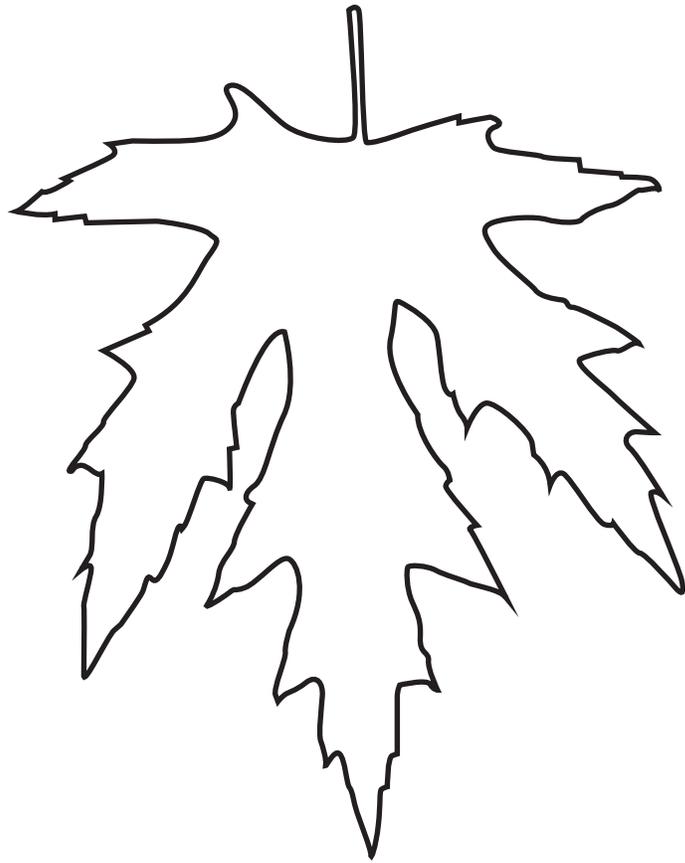
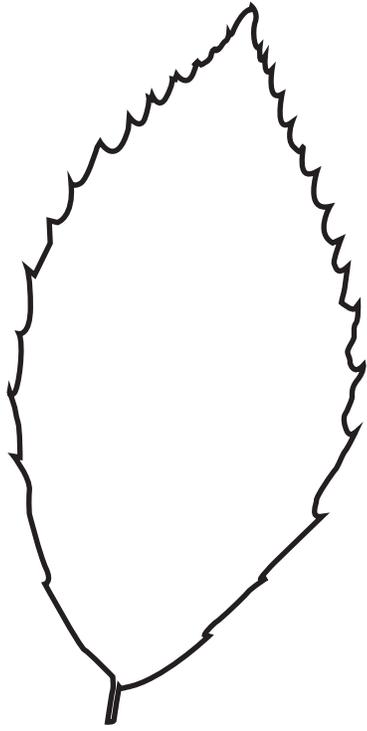


# BINGO











# WICKED COOL WEATHER

## STEM Preschool Teaching Unit

Ages 2.9-5 years

[www.massaudubon.org/education](http://www.massaudubon.org/education)

**W**eather. It's all around us. It affects us every day from the clothes we wear to the kinds of activities we do outside. Watching the weather—clouds, rainfall, and wintry weather gives young children to opportunity to make connections between the weather they experience and how it affects the world around them.

1. What is Weather?
2. Weather Tracking Tools
3. Weather in the World
4. Seasonal Cycles
5. Water, Water Everywhere
6. How Does the Weather Affect Plants and Animals?



**G**rab your raincoat and step into the exciting world of weather. In Massachusetts, our weather is always changing and it's these changes that generate opportunities for questions, investigations, and discovery. Observing the weather on a regular basis and providing opportunities to collect data and record how weather changes over time can nurture a fascination with the science behind the rain, clouds, fog, snow, and sun that we experience throughout the year.

Weather affects our lives in many ways as well as the world around us. Children love stomping through puddles after a heavy rain, but why do some puddles collect in the same place on the schoolyard? How do heavy rains affect the playground? How many sunny days does a puddle need before it dries up? Why does snow change to rain on an early spring day? Weather is a reminder that science is happening all around us, all the time.



**Investigation Objectives and Alignment to  
Massachusetts Department of Education Pre-K Science, Technology  
and Engineering Standards 2013  
for 2015-2016 implementation**

Investigation	Children will be able to:	Pre-K STE Learning Standards
<b>#1: What is Weather?</b>	<ul style="list-style-type: none"> <li>• Describe and act out different types of weather.</li> <li>• Observe and collect data shadows throughout the day.</li> </ul>	<p><b>PreK-ESS1-2.</b> Observe and use evidence to describe that the sun is in different places in the sky during the day.</p> <p><b>PreK-PS4-2.</b> Connect daily experience and investigations to demonstrate the relationships between the size and shape of shadows, the objects creating the shadow, and the light source.</p>
<b>#2: Weather Tracking Tools</b>	<ul style="list-style-type: none"> <li>• Observe and track weather over time, categorizing and noting patterns throughout a period of time.</li> <li>• Describe how weather changes from day to day and throughout the year.</li> <li>• Construct simple weather tracking tools that will support data collection in the field.</li> </ul>	<p><b>PreK-ESS2-4.</b> Use simple instruments to collect and record data on elements of daily weather, including sun and clouds, winds, snow or rain, and higher or lower temperatures.</p> <p><b>PreK-ESS2-5.</b> Describe how local weather changes from day to day and over the seasons and recognize patterns in those changes.</p> <p><b>PreK-ESS2-6.</b> Understand the impact of weather on living things.</p> <p><b>PreK-LS-I-4.</b> Use their five senses in their exploration and play to gather information.</p>
<b>#3: Weather in the World</b>	<ul style="list-style-type: none"> <li>• Observe and discuss how weather affects the landscape and our lives.</li> <li>• Build and use simple wind tracking tools to collect information on wind speed and its impact.</li> </ul>	<p><b>PreK-LS-I-4.</b> Use their five senses in their exploration and play to gather information.</p> <p><b>PreK-ESS2-4.</b> Use simple instruments to collect and record data on elements of daily weather, including sun and clouds, winds, snow or rain, and higher or lower temperatures.</p>
<b>#4: Seasonal Cycles</b>	<ul style="list-style-type: none"> <li>• Describe how weather changes over time from day to day and season to season.</li> <li>• Observe and describe patterns in data that demonstrate changes in the seasons (i.e. rain the fall, snow in the winter)</li> </ul>	<p><b>PreK-ESS2-5.</b> Describe how local weather changes from day to day and over the seasons and recognize patterns in those changes.</p> <p><b>PreK-ESS2-6.</b> Understand the impact of weather on living things.</p> <p><b>PreK-LS-I-4.</b> Use their five senses in their exploration and play to gather information.</p>



<p><b>#5:</b> <b>Water, Water Everywhere</b></p>	<ul style="list-style-type: none"> <li>• Build simple model to learn about the water cycle.</li> <li>• Describe the relationship between water, snow, and ice.</li> <li>• Describe and act out the water cycle.</li> </ul>	<p><b>PreK-ESS3-2.</b> Observe and discuss the impact of people’s activities on the local environment.</p> <p><b>PreK-PS1-1.</b> Raise questions and investigate the differences between liquids and solids and develop awareness that a liquid can become a solid and vice versa.</p> <p><b>PreK-LS-1-4.</b> Use their five senses in their exploration and play to gather information.</p>
<p><b>#6:</b> <b>How does weather affect plants and animals?</b></p>	<ul style="list-style-type: none"> <li>• Describe how animals and plants adapt to the changing seasons.</li> </ul>	<p><b>PreK-LS-1-4.</b> Use their five senses in their exploration and play to gather information.</p> <p><b>PreK-ESS2-6.</b> Understand the impact of weather on living things.</p>



## Suggested outdoor exploration materials

- String or yarn
- Coffee filters
- Hand lenses
- Popsicle sticks
- Clipboards (can attach pencils with string or velcro)
- Trowels (small shovels)
- Penlight or other small flashlight
- Small plastic containers to hold living things
- White plastic plates to observe samples
- Ziploc bags, various sizes
- Plastic terrariums
- Spray bottles
- Measuring tapes or string
- Disposable or digital camera
- Crayons and markers (fine and thick point)
- Paints
- Clay or play dough
- Collage materials
- Bendable wire or pipe cleaners

### Keep it easy!

- Assemble outdoor kits in backpacks to pick up and go as you walk outdoors!
- Families will gladly save and send in recyclable containers that are both reusable and disposable. Just ask!



# WICKED COOL WEATHER

## Basic Concepts and Fun Facts



### What is Weather?

- Weather is the day to day atmospheric conditions in a particular location.
- Weather includes temperature, precipitation, cloud cover, wind, and air pressure.
- Examples of weather – today is warm and humid; the weather prediction for tomorrow is for clouds and rain.

### What causes weather?

- The energy at the earth's surface comes from the sun's rays being absorbed by the earth and the atmosphere.
- The earth is round so the sun's rays do not reach the surface of the earth at the same angle from the equator to the poles. Example - the sun is directly overhead at the equator so the equator is much warmer than the North pole where the sun is never very high over the horizon.
- The differences in temperature (energy) and the daily rotation of the earth cause the movement of air and moisture around the globe that creates weather.

### What is Climate?

- Climate is the average of weather patterns over a long period of time, at least 30 years. Example – weather is what determines what we will wear each day but climate is what determines our wardrobe.
- Climate can refer to a particular location. Example – the climate of Boston is colder than the climate of Miami. Or it can refer to the overall climate of the earth. Example – the average temperature of the earth has increased 1.0°F over the past 30 years.

### How does weather change throughout the seasons?

- In the northern hemisphere the amount of sunlight is greatest during the summer and lowest in the winter.
- With less sunlight in the winter there is less energy and winter is colder than summer when there is more energy from the sun

### Why do we have seasons?

- The earth's axis tilts 23.5° degrees from vertical. As the earth orbits the sun this tilt causes the northern hemisphere to be tilted away from the sun during the winter and towards the sun during the summer. This results in less sunlight reaching Massachusetts which means less energy and lower temperatures in the winter and more sunlight reaching Massachusetts which means more energy and higher temperatures in the summer.

### How do we track weather?

- Weather is tracked by satellite and stationary weather stations that record air temperature, air pressure, wind speed and direction, precipitation, and cloud cover.
- By analyzing and comparing the current data gathered to decades worth of data and patterns, meteorologists can make weather predictions.



## How does weather and climate affect the world around us?

In Massachusetts, our seasons cycle from cold, snowy, short day winters to hot, humid, long day summers with spring and fall transitional periods in between. All living things have survival strategies that allow them to get through the variation in weather throughout the seasons and reproduce successfully

### Humans

- Weather determines what we wear every day and often what we do. Examples – The baseball game was cancelled because of the rain;
- Weather and climate both affect how people live and heat or cool their houses.
- Even our school year is based on our climate as traditionally schools close during the summer because the students had to work on the farm during the busy growing season.

### Land

- Precipitation has an impact whenever it falls on the land. Water can cause erosion or can accumulate in low lying areas and cause flooding.
- Water levels rise and fall seasonally depending on precipitation, snow melt, etc.

### Plants

- Plants in Massachusetts are adapted for a seasonal cycle that exhibits a lot of temperature variation throughout the year. All plants need to have adaptations to survive the freezing temperatures of the winter – most plants here become dormant in the winter. Leaf drop in the fall is a sign of dormancy in trees. Many perennials die off back to their roots. Plants also need adaptations to survive the heat of the summer.
- Plant life cycles have to be adjusted to the seasons. Plants grow and flower in the spring and summer, and produce seeds in the summer and fall, and then die off or go dormant in the winter.

### Animals

- Similar to plants, animals in Massachusetts need to adapt to the wide temperature variations in our climate. Animals survive

the winter through one of 3 strategies – dormancy, migration, staying active or resistance

- Dormancy – physiological changes in the animals allow them to survive the winter in a colder state than normal and with little to no food requirement. Hibernation is a form of dormancy in some mammals. Amphibians and reptiles exhibit another form of dormancy called brumation and spend the winter buried in the mud or under leaves or rocks. Insects go into diapause that allows them to suspend all growth and development during the winter.

**Migration** – moving to an area with greater food availability is a survival strategy for some animals. Almost all of the migrators are birds and some of the larger insects. Birds that migrate don't do so because they get cold; they migrate in response to the change in day length. Mammals and reptiles do not migrate in this part of the world.

**Staying active** – many mammals in Massachusetts remain active all winter. The biggest survival factor for these animals is having a food supply to get them through until spring which is why squirrels store nuts in the fall.

- Reproductive activities are timed to ensure that offspring are produced when there is maximum food supply and time for the offspring to mature enough to survive the winter. This means most small mammals, birds, amphibians, and reptiles breed in the late winter or early spring to give birth or hatch their young in the spring or early summer. Larger mammals breed in the fall or winter in order to give birth in the spring.

### What is the Water Cycle?

- The amount of water on the earth is a constant. The water cycle describes the continuous movement of water on, above, and below the surface of the Earth. Rain, snow, glaciers, fog, clouds, evaporation, condensation, rivers, lakes, streams, ground water, marshes, oceans, etc are all part of the water cycle. All living things are also part of the water cycle as they use water during their life cycles.



- Water vapor in the air condenses into tiny water droplets and forms clouds. As the droplets come together they eventually get too heavy and fall to the ground as rain, snow, hail, sleet, etc. If the water lands on the ground, it can flow along the surface and eventually enter a stream, river, lake, or ocean or it can infiltrate into the groundwater. Water on the earth or in the ocean is constantly evaporating back to water vapor. The water vapor moves through the atmosphere to condense back into clouds. The movement of water through the atmosphere is a critical component of weather systems and storms.
- At any given moment most of the water is in the oceans as saltwater. The amount of available fresh water, which all plants and animals require to survive, is a very small percentage of the total amount of water on earth.



# PRESCHOOL INTEREST AREAS PLANNING FORM

## THEME: WICKED COOL WEATHER

(#1-6 indicates the investigation to go to for detailed instructions)

<p><b>ART</b></p> <ul style="list-style-type: none"> <li>• Sun catchers (#1)</li> <li>• Epsom salt painting (#5)</li> <li>• Cloud spotches (#2)</li> <li>• 3D clouds, sun (#1)</li> <li>• Snowflake cutouts (#1)</li> <li>• Wind sculptures (#3)</li> <li>• Rain paintings (#3)</li> <li>• Seasonal collages (#4)</li> <li>• Water art (#5)</li> <li>• Ice sculptures (#5)</li> </ul>	<p><b>DESIGN/ENGINEERING</b></p> <ul style="list-style-type: none"> <li>• Pinwheels (#2)</li> <li>• Make a wind sock (#2,#3)</li> <li>• Make a weathervane (#2,#3)</li> <li>• Make a rain gauge (#2)</li> <li>• Make a barometer (#2)</li> <li>• Building with ice blocks and snow (#5)</li> <li>• Plants and water (#6)</li> <li>• Wind power (#3)</li> <li>• Insulation experiment (#6)</li> <li>• Kites, bubbles in the wind (#2)</li> </ul>	<p><b>COOKING</b></p> <ul style="list-style-type: none"> <li>• Fresh vs sun-dried (#3)</li> <li>• Solar oven (#3)</li> <li>• Sun tea (#3)</li> <li>• Meringue clouds (#1)</li> <li>• Sugar on snow (#5)</li> </ul>	<p><b>DISCOVERY/SCIENCE</b></p> <ul style="list-style-type: none"> <li>• Air catchers (#1)</li> <li>• Cloud in a jar</li> <li>• Make a barometer (#1)</li> <li>• Condensation (#5)</li> <li>• Weather detectives (#3)</li> <li>• Cloud categories (#3)</li> <li>• Water table water cycle (#5)</li> <li>• 4 season tree (#4,#6)</li> <li>• What season is it? (#6)</li> <li>• Investigate buds (#6)</li> <li>• Investigate water drops (#5)</li> </ul>
<p><b>DRAMATIC PLAY</b></p> <ul style="list-style-type: none"> <li>• Weather forecast station (#1,#2,#3,#4)</li> <li>• Weather doll (#1,#3,#4)</li> <li>• Weather/Rain Theater (#1,#5)</li> <li>• Migration game (#6)</li> <li>• Coping with cold (#6)</li> <li>• Winter adaptations – the long trip (#6)</li> </ul>	<p><b>LITERACY</b></p> <ul style="list-style-type: none"> <li>• See attached annotated bibliography for multiple selections</li> <li>• Use your local library as a resource.</li> </ul>	<p><b>MUSIC/MOVEMENT</b></p> <ul style="list-style-type: none"> <li>• Act out a rainstorm (#1,#5)</li> <li>• Move in the wind (#3)</li> <li>• Be a water molecule through the water cycle (#5)</li> <li>• Have a wind parade (#1,#2,#3)</li> <li>• Sounds form wind (#3)</li> <li>• Water cycle dance (#5)</li> <li>• Snow songs (#5)</li> </ul>	<p><b>OUTDOORS</b></p> <ul style="list-style-type: none"> <li>• Keep a weather journal (#1,#2,#3,#4)</li> <li>• Weather tools outside (#2,#3,#4)</li> <li>• Signs of seasons/effects of weather (all)</li> <li>• Weather watching (#2,#3)</li> <li>• Animals through the seasons (#6)</li> <li>• Weather walk (#1,#4,#5)</li> <li>• Winter Twigs (#6)</li> <li>• Ice sculptures (#5)</li> </ul>
<p><b>SENSORY</b></p> <ul style="list-style-type: none"> <li>• Feel the weather (#3)</li> <li>• Water cycle in the water table (#5)</li> <li>• Snow/ice in the water table (#5)</li> <li>• Insulation experiments (#6)</li> <li>• Moving in weather (#3)</li> <li>• Comparing snow (#5)</li> </ul>	<p><b>MATH/NUMERACY</b></p> <ul style="list-style-type: none"> <li>• Cloud matching game (#2)</li> <li>• Tally types of weather (#4)</li> <li>• Record rainfall/snowfall (#2,#4)</li> <li>• Beaufort wind scale (#2,#3,#4)</li> <li>• Chart temperatures (#2,#4)</li> <li>• Track shadows (#4)</li> </ul>	<p><b>COMMUNITY CONNECTIONS/ PARENT INVOLVEMENT</b></p> <ul style="list-style-type: none"> <li>• Record weather at home (#2,#3,#4)</li> <li>• Weather watching at home (#2,#3,#4)</li> <li>• 4 season tree at home (4,6)</li> </ul>	<p><b>GAMES/MANIPULATIVES</b></p> <ul style="list-style-type: none"> <li>• Weather charting (#2,#3,#4)</li> <li>• Make a cloud (#5)</li> <li>• Ice sculptures (#5)</li> <li>• Squirrel it away (#6)</li> <li>• What season is it (#6)</li> <li>• Flying south (#6)</li> </ul>



# INVESTIGATION SUMMARIES

Big Ideas	Investigation #1 What is weather?	Investigation #2 How do we track weather? What kinds of tools do we use?	Investigation #3 How does weather affect the world around us?
<b>LARGE GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• What do children already know about weather, seasons, weather words, etc</li> <li>• Discuss types of weather, signs of weather</li> <li>• Act out different types of weather</li> </ul>	<ul style="list-style-type: none"> <li>• Use weather tools to make daily observations</li> <li>• Use a standard preschool calendar and record more detailed information of weather</li> <li>• Make weather charts to track weather – temperature, wind speed, clouds, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Be weather detectives - how does the weather effect our daily routines</li> <li>• Feel the weather</li> <li>• Wind power</li> <li>• Measuring wind speed</li> <li>• Fresh vs sun-dried</li> <li>• Rain paintings</li> </ul>
<b>SMALL GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• Create a weather forecast station</li> <li>• 3D weather cut-outs</li> <li>• Snowflake cut-outs</li> <li>• Sun catchers</li> <li>• Weather forecast station</li> </ul>	<ul style="list-style-type: none"> <li>• Cloud shapes/cloud matching</li> <li>• Cloud splotches</li> <li>• Make and use weather tools – pin-wheel, windsock, weather vane, barometer, rain gauge</li> <li>• Weather reports from the weather station</li> </ul>	<ul style="list-style-type: none"> <li>• Weather dolls</li> <li>• Cloud categories</li> <li>• Sound of the wind</li> <li>• Wind sculpture</li> <li>• Sun tea</li> <li>• Solar oven</li> </ul>
<b>OUTDOOR LEARNING</b>	<ul style="list-style-type: none"> <li>• Take a weather walk and look for signs of weather</li> <li>• How does the weather feel – cold, warm, wet, dry, windy, calm, etc.; compare to actual weather data</li> </ul>	<ul style="list-style-type: none"> <li>• Air catchers</li> <li>• Weather watching together</li> <li>• Kites and bubbles in the wind</li> </ul>	<ul style="list-style-type: none"> <li>• Searching for evidence of weather                             <ul style="list-style-type: none"> <li>– erosion, puddles/streams, broken branches, mud, snow</li> </ul> </li> <li>• Observe how weather effects our movement (ice, snow, mud, puddles, wind)</li> </ul>



# INVESTIGATION SUMMARIES

<b>BIG IDEAS</b>	<b>Investigation #4</b> How does weather change throughout the seasons?	<b>Investigation #5</b> Water, Water, Everywhere... Where does water come from? Where does it go?	<b>Investigation #6</b> How does weather affect plants?
<b>LARGE GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• Talk about seasonal clothing needs</li> <li>• List the signs of a season</li> <li>• Record daily temperature over a season or year</li> <li>• List aspects of weather by season – which change and which stay the same</li> <li>• Dress a weather doll</li> <li>• Four seasons tree</li> <li>• Weather math – tally the number of days of each type of weather</li> <li>• Make seasonal collages</li> </ul>	<ul style="list-style-type: none"> <li>• Act out a rain storm</li> <li>• Act out the water cycle</li> <li>• Water cycle dance</li> <li>• Cloud in a jar</li> <li>• Make a cloud</li> <li>• What is snow</li> <li>• Snowflake match-up</li> <li>• Snow songs</li> <li>• Dropper doodles</li> <li>• Epsom salt painting</li> <li>• Water table play with snow/ice, water with sponges, watering cans, pipettes and containers</li> <li>• Cloud matching game</li> </ul>	<ul style="list-style-type: none"> <li>• Seasonal tree and animal activities</li> <li>• Guess the season</li> <li>• Plants and water</li> <li>• Winter twigs</li> <li>• Coping with cold</li> <li>• Landmark migration game</li> <li>• Migration planning – the long trip</li> <li>• Look at buds</li> <li>• Insulation experiment</li> <li>• Flying south</li> </ul>
<b>SMALL GROUP LEARNING</b>	<ul style="list-style-type: none"> <li>• Weather walk</li> <li>• Seasonal investigations</li> <li>• Sugar on snow</li> <li>• Ice sculptures</li> <li>• Condensation experiment</li> <li>• Water cycle walk</li> <li>• Snow sticks</li> <li>• Water art</li> <li>• Comparing snow</li> </ul>	<ul style="list-style-type: none"> <li>• Squirrels and nuts</li> <li>• Buds</li> <li>• Twigs</li> <li>• Seasonal signs</li> <li>• Dressing for the weather</li> </ul>	
<b>OUTDOOR LEARNING</b>			



# What is Weather?

## LARGE GROUP LEARNING ACTIVITIES

**W is for Weather:** Start with a discussion that allows children to describe what they already know about weather, how it affects their lives, and how it affects the lives of plants and animals. Talk with the group about types of weather – rain, snow, sun, wind, clouds, etc. You can provide colorful pictures or photographs of weather as you discuss.

See how many “weather words” children can come up with, including words that describe how one experiences weather (hot, cold, wet, rustle, etc.). To expand, see if children can create their own words to describe a type of weather. Use chart paper and markers to document student language and discussion.

Use a K-W-L chart to document what students KNOW, WANT to know about weather. At the end of the lesson (and unit), you can share what you LEARNED about weather.

What do we KNOW?	What do we WANT to know?	What did we LEARN?
Rain is weather	What happens to all the rain?	
I wear lots of clothes in winter	How do animals stay warm?	



**Weather Theater:** Materials: Pictures of types of weather

Description: Show pictures of different types of weather, have the children try to act them out. Have each child come up with their own ‘weather yoga’ and let them teach everyone else. Give them ribbons and let them act out wind or falling snow. Give them drums and rattles and let them act out a rainstorm.

Read: *The Sun, the Wind and the Rain* by Henry Holt

Sing: How’s the Weather Today? Tune and Words available here:

[www.youtube.com/watch?v=rD6FRDd9Hew](http://www.youtube.com/watch?v=rD6FRDd9Hew)

## SMALL GROUP LEARNING ACTIVITIES

**3D Weather Cut-outs:** Make 3-dimensions weather cut-outs to hang around the classroom.

Materials: Newspaper, large white paper, paint, objects of different color/texture, glue

Description: Cut out cloud and sun shapes. Make two of each shape and staple the two sides together, leave an opening, stuff with batting or newspaper, and then staple the opening closed. Paint the outside and glue on yellow, orange objects for the sun or white, fluffy objects for clouds. Hang your weather cutouts around the classroom! You can make it cloudy on one side and sunny on the other. Or, mix it up. Students can act out different weather “events” under the shapes.



## OUTDOOR LEARNING ACTIVITIES

### Snowflake Cut-outs

Materials: Coffee filters, scissors

Description: Fold filter into 6ths, then have the children cut shapes out of the filter. Unfold and hang in the windows or around the classroom with your 3D cut-outs.

### Meringue clouds

Materials: egg whites, dash of cream of tartar, oven, baking tray

Description: Crack eggs into a bowl and remove egg yolks. Beat egg whites until stiff adding cream of tartar as they thicken. Place small amounts of mixture onto a baking tray and bake at 300°F for 30 minutes. Use as clouds.

Talk about clouds as a collection of very tiny droplets of water that are light enough to float in the air. The tiny droplets join together and get bigger and get heavier until they finally fall as rain or snow.

### Sun Catchers

Materials: thin cardboard or card stock, contact paper, tissue paper and/or colored cellophane

Description: Cut an opening in the middle of the cardboard or card stock. Peel and stick a sheet of contact paper over the opening. Have the children stick squares of tissue paper or colored cellophane onto the contact paper. Thread a loop of yarn or string on the completed sun catcher and hang in the window.

Encourage children to observe them on cloudy and sunny days.

### Build a Weather Forecast Station

Materials: Weather forecaster costume materials, felt board, felt pieces of weather, laminated weather forecast symbols (arrows in blue and red, maps, etc.), toy microphone

Description: If possible, show children an actual weather report on a laptop or TV. Introduce the felt board with weather pictures and forecast symbols. Mount the board and costume items in the dramatic play area for free exploration.

### Weather walks

Materials: Clipboard, journals, crayons

Description: Take a weather walk multiple times during the school year and record the weather. Make “weather journals” to bring on your walk. Sometimes visit the same spot, other times walk around and explore.

- Draw what is happening in the sky, the clothes they are wearing, weather based activities they observe (building snow men, splashing in puddles, shielding eyes from the sun).
- Look for evidence of weather (downed branches, puddles, erosion) and have them draw what they see.
- Make sure to date each entry and record the weather and temperature that day. The teacher can also keep notes on the clipboard to remind friends of what they observed during the previous outing.
- For a community connection, ask the children to take the journals home and record observations about the weather at home.
- Ask the children what the weather feels like – warm, cold, wet, windy, etc. Compare what they feel to the actual temperature or wind speed, etc.

### Shadow Activities

To begin, ask children if they know what a shadow is. Invite them to describe what they already know about shadows. In order to learn more about what they know about shadows, you can ask them to describe their experiences with shadows. What does your shadow do when you move? Dance? Jump up and down?

Next, go outside and learn through play. Have each of them play with their shadows as well as with objects that make shadows. How many shadows can they find? After some time exploring, ask the children to gather around and observe one child as they play with their shadow. Ask the same questions about how their shadow moves. Try to make shadow creatures! Can you make a four-armed person? How could you make



antlers, a different shaped body, or a tail using objects from outside? Can one child hide another child's shadow?

### **What is a shadow?**

A darker area created by an object coming between a source of light and a surface.

### **Other fun shadow games:**

- **Shadow Tag:** Play shadow tag in a grassy field on a sunny day. If you step on a shadow, you are "it". Is it easy or hard to catch up with someone's shadow? Take turns being "it".
- **Shadow Tracking:** You can track shadows of object or yourself. Have children stand in one place. Mark an "X" where they stand and have a partner trace their shadow with sidewalk chalk. Make your first shadow trace in the morning. Head out again in the middle of day. Stand on the "X" and trace the shadow again. Has it moved? You can also trace a static object in your schoolyard. A barrel, flagpole, fencepost.
- **Shadow Hand Puppets:** Turn down the lights in the room. With a bright lamp and blank wall, you can make hand shadow puppets. On a sunny day, you can even make them with sunlight coming through the window or outside. Some great resources and tips for different hand shadows are here: [www.pinterest.com/robanw/hand-shadow-puppets/](http://www.pinterest.com/robanw/hand-shadow-puppets/)



# Weather Tracking Tools

How do we track the weather?

What kinds of tools do we use to track the weather?

## LARGE GROUP LEARNING ACTIVITIES

### Weather Trackers

Ask students: Do you watch the weather? What is the weather like today? Make talking about weather and recording data part of your gathering circle time at the start of the day. Ask the children how they decided what to put on today or how did their parents decide? How do you know what to wear so you are comfortable throughout the day? Ask the students what the weather was like yesterday? Is it the same as it is today or very different? Depending on the time of year, choose milestone events to ask them about the weather in the past, i.e. during winter break was the weather the same as it is today? Discuss how you will track weather every day. Develop charts for temperature, sun, rain, wind, etc. and collect the same information every day. Reflect with the students how it changes over the course of the school year.

### Tools of the Trade

Materials: Pictures of weather tracking tools, thermometers, rain gauge, barometer, anemometer.

Description: Discuss and show the children different weather tools. See if they can guess what they are for. Give them ample time to explore the tools and to use them outside, if possible.

### Charting the Weather (Large Group and Outdoor Learning)

Materials: Thermometer, rain gauge (a simple glass jar with a ruler taped to it will do), chart paper, markers, Beaufort wind scale (<http://www.spc.noaa.gov/faq/tornado/beaufort.html>)

Description: Record the weather daily on large chart paper; include rain/snow fall, wind scale, weather type and temperature. If possible, continue recording throughout the year. Look at the information for seasonal and yearly patterns and differences. Make note of any extreme weather events (hurricane, blizzard, heavy rains, etc.) on the charts. You may wish to use a different color marker for each month to help track the seasonal changes. Types of graphs that work well included bar graphs, line graphs, histograms and picture graphs.

**Read:** *What will the Weather Be?* By Linda DeWitt and Carolyn Croll

Discuss how scientists who study the weather are called meteorologists. They study patterns of weather over time to predict the weather. If you have set up a weather forecast station, you may choose to incorporate daily weather reports in the dramatic play area!

## SMALL GROUP LEARNING ACTIVITIES

### Cloud Shapes/ Cloud Matching

Materials: Cloud pictures, laminator or contact paper, cardboard



Description: Cut-out several sets of cloud images and laminate them. Use the images to create bingo boards or simply use the images to play concentration or other matching games. Great cloud photos can be found at <http://www.weatherwizkids.com/weather-clouds.htm>

**Read:** *It Looked Like Spilt Milk* and make your own paint splotch clouds.

### Cloud Splotches

Materials: *It looked like Spilt Milk*, white paint, blue paper, spoon

Description: After reading *It looked like Spilt Milk*, have the children spoon white paint into the middle of a blue piece of paper, then fold the paper in half. Open the paper to observe the shape. For added fun, have them describe that they think their cloud looks like.

**WICKED COOL WEATHER TOOLS** - build them inside and take them outside!

### Pinwheels

Materials: cardstock or thin cardboard, scissors, markers, string, beads, or pencils and tacks

Description: Cut the cardstock into a square. Draw a line from each corner halfway to the center of the square. Have the children color the square and cut along the lines. Use a tack to poke a hole into the right corner of triangle and into the center of the square. Either tack the 4 corners into the center and press into the eraser of a pencil or thread yarn through the 4 points and the center and knot with beads on either side. The yarn pinwheels work well for hanging from trees or porches; the pencil pinwheels can be stuck into the ground. Either is fun to take outside for weather observation.

### Windsocks

Materials: Sleeve of an old long sleeved shirt, needle and thread, string, wire, small rock

Directions: For diagram and detailed instructions, see: [www.weatherwizkids.com/experiments-windsock](http://www.weatherwizkids.com/experiments-windsock)

### Weather Vanes

Materials: Straw, pencil, straight pin, cardstock or thin cardboard, tape.

Directions: For detailed instructions on how to make this simple weather vane go to *Hands-On Nature*, pp. 289.

Experiment and observe how the weather vane behaves depending on the size of the shapes on the end of the vane as well as the speed of the wind. Can the students see how the vane changes depending on the direction of the wind?

**Barometers:** Barometers keep track of air pressure. When air pressure is high, that indicates fair weather. Low air pressure often indicates a storm.

Materials: Balloon, glass canning jar, rubber band, straw, paper

Directions: Cut the lip off the balloon. Stretch the balloon over the glass jar and secure it with the rubber band. Tape the straw across the balloon. Tape a paper to the wall, place the jar in front of the paper, and mark the height of the straw. As the air pressure changes, the straw should move up and down. Make note of the height and what weather is like during those “highs” and “lows”. Test the accuracy your homemade barometer by comparing it to an actual barometer or data online.

**Rain Gauge:** Rain gauges help us to collect information on how much rain falls in a rainstorm.

Materials: plastic 1 liter soda bottle, 2-3 large stones or bricks, tape, marker, ruler

Directions: Cut the top off of the bottle. Turn the cut-off top upside down and place it, neck down, onto the bottle. Tape it to the two pieces of the bottle together. Use the ruler and permanent marker to create a measurement scale on the bottle. Find a good location outside away from any buildings or trees, etc. and place the bottle on the ground. Use the rocks or bricks to hold it in place so that it won't fall over. Now, wait for the next rain! After it rains, check to see how much rain fell at your school.



Discuss with students if the amount of rain is related to how long the storm lasted? If the rain happens during the school day, measure how long the rain storm was. Ask the students if they would describe the rain as heavy or light? Some of the most fun discussions can happen by comparing rainfall over the seasons. Let snow fall into your rain gauge. Measure the snow height. Bring it inside and watch it melt. Is the height of the water the same as the height of the snow?

## OUTDOOR LEARNING ACTIVITIES

### Air Catchers

Materials: yogurt container lids, vaseline

Directions: Ask students how they can tell it is windy.

Explain that you're going to do an activity that will make the air more visible. Spread vasoline onto the yogurt container lids. Bring the lids outside—observe what happens! This is a great lead-in to Investigation #3—How Does the Weather affect the World Around Us?

### Weather Watching Together

- Lie down and look
  - Lie on your back and look up at the clouds
  - What kinds of clouds do you see?
  - What shapes do you see? Can you make up a cloud story?
  - Are they clouds moving in one direction?
- Watching the wind
  - What can you observe that tells you the direction of the wind?
  - Fly kites! Make your own kites and fly them on a windy day.
  - Blow bubbles in the wind. What direction do they fly on different days?



# Weather in the World

**How does weather affect the world around us?**

**Develop an awareness of how weather affects the world around us by observing the world around us.**

## LARGE GROUP LEARNING ACTIVITIES

### Feel the Weather

Materials: fan, spray bottle, lamp

Description: Have the children sit with closed eyes, then walk around and have them “feel” a weather type, then describe or identify it. This activity can also be done outside while having the children talk about the different types of weather they can feel.

**Weather Detectives:** Discuss with the children: How does weather affect our daily lives, whether it is snow, wind, rain, or heat? How does it affect what we can do? How we dress? How we play? How can we find evidence that a weather event has occurred? Where can we find evidence – look up, down, around? What does it look like outside after a heavy rain or windstorm? How do different kinds of weather make you feel – rainy, sunny, snowy, windy? What is your favorite weather?

### Wind Power

Materials: electric fan, butcher paper, selection of objects provided by teacher and students

Description: Place the butcher paper on top of a table. Place the fan at one end of the table. Have children select an object and make predictions about what will happen when the fan is turned on. Take turns placing the objects on the paper and turning on the fan. Mark how far each object moves across the paper. Ask the children to select objects they think will move the farthest, the fastest, or won’t move at all.

**Measuring Wind:** Investigation #2, gave directions for making simple tools to observe the direction or speed of the wind. In addition there is a measurement system called the Beaufort Wind Force Scale that can be used to measure wind speed based on your observations.

Here’s the scale as well as some background:

[www.srh.noaa.gov/jetstream/ocean/beaufort\\_max.htm](http://www.srh.noaa.gov/jetstream/ocean/beaufort_max.htm)

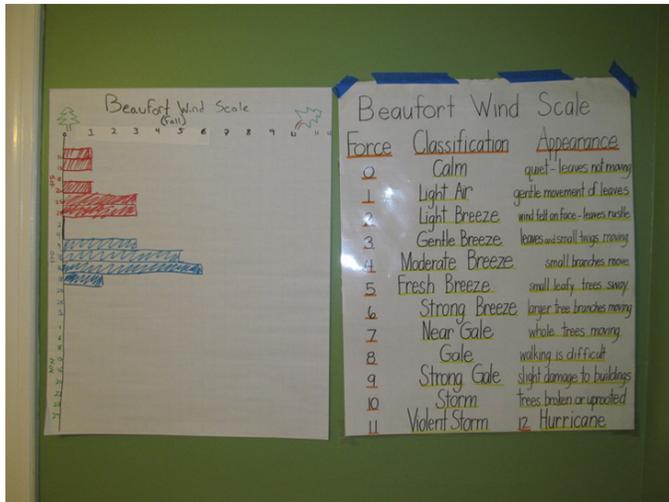
These links have some graphics that might be fun for the classroom:

<http://urbanflyventures.com/wp-content/uploads/2011/05/beaufort-scale-cartoon.gif>

[http://urbanflyventures.com/wp-content/uploads/2011/05/beaufort\\_scale\\_tbp.gif](http://urbanflyventures.com/wp-content/uploads/2011/05/beaufort_scale_tbp.gif)



Here is an example of how young students can measure the wind by what they observe, using the Beaufort Wind Scale:



### Fresh vs. Sun-Dried

Materials: grapes and raisins, cranberries and craisins, chart paper and markers

Description: Explain that we're going to use our five senses to describe two different things. Give each student a raisin but tell them not to eat them yet.

Make a chart of descriptive words about raisins. Give each student a grape but tell them not to eat them yet. Make a chart of descriptive words about grapes.

Discuss what is similar and different on the two charts – as color, water content, texture, size, etc. Discuss how raisins are made and how weather can cause that to happen to plants. Have snack!

### Rain paintings

Materials: Coffee filters, washable markers, spray bottle (if not raining), trays

Description: Cut the coffee filters into raindrop shapes or use the filters as they come. Have the children color the filters with washable markers. Set the filters on trays. Either set the tray out in a gentle rain or spray the filters with water. What happens if you set the tray out in a heavy rain? Experiment with different amounts of water. Allow the filters to dry and see what has happened to the colors. You can even track how long it takes your filters to dry on different days. It's always a good idea to repeat these types of

activities in different conditions—that's what helps us notice how the different weather affects the world around us!

Read: Books that share how weather “feels” and how it affects people and places

- *Feel the Wind* by Arthur Dorros
- *The Wind Blew* by Pat Hutchins
- *The Sun, the Wind and the Rain* by Henry Holt

## SMALL GROUP LEARNING ACTIVITIES

**Weather Dolls:** This activity can be introduced in the large group and then be placed in the dramatic play area for small group learning.

Materials: Dolls with a variety of clothing including shorts, pants, coats, boots, hats, scarves, umbrellas, mittens, etc. This activity can also be done with “paper dolls” on the felt board.

Description: Have a station where children can dress dolls, stuffed animals, felt board people or paper dolls in clothing for various weather types

**Cloud Categories** (adapted from *Hands-On Nature*, pp. 290)

Materials: Laminated pictures of the three major categories of clouds—cumulus, cirrus, stratus.

Description: Use the cloud shapes and discuss the shape of each type of cloud. Have a pile of other cloud pictures with different shapes and work with the students to sort the cloud shapes in categories by type of cloud. Discuss how different cloud shapes give us clues about the weather.

### Sounds From Wind

Materials: Sticks (½-1” diameter; 1-3’ long), string or fishing line, objects to hang—old utensils, washers, metal disks, shells, beads, etc.

Description: Tie the objects on to the sticks so that they can be moved around and students can test different configurations to make new sounds. Hang the sticks where the students can hear them moving in the wind.

### Wind Sculpture



## OUTDOOR LEARNING ACTIVITIES

Materials: Old 1 liter plastic bottles, string, box cutter or Exacto knife, paint, paper, colored pens

Description: Have children determine where they would like windows cut into the plastic soda bottle and draw rectangles where they choose. Use the box cutter or Exacto knife to cut three sides of the rectangle to create flaps that will catch the wind. Children can decorate bottles with glitter, paper, paint, or whatever decorative materials you choose! Watch your sculpture spin!

### START INSIDE AND FINISH OUTSIDE

#### Sun Tea

Materials: fresh herbs or herbal tea, water, pitcher, cups

Description: Have children pick herbs if you have some in a school garden or get some herbs at the store. Add the herbs to a pitcher of water. Leave the pitcher of water in the sun for 20-30 minutes to allow the water to become flavored by the herbs and warmed by the sun. Discuss how the temperature and taste of the water differed before and after.

#### Cooking with the Sun

Materials: pizza box, aluminium foil, box cutter or Exacto knife, something easily melted such as marshmallows

Description: Line the inside of the pizza box completely with foil. Cut a square flap in the center of the lid of the box. Place some marshmallows inside. Put the solar oven in a warm sunny location with the flap at an angle that catches the rays of the sun and focuses them into the box. Enjoy your solar smores. More detailed instructions found here: [www.nmsea.org/Curriculum/4\\_6/pizza\\_box\\_oven/pizza\\_box\\_ovens.htm](http://www.nmsea.org/Curriculum/4_6/pizza_box_oven/pizza_box_ovens.htm)

#### Moving in the Weather

Materials: clipboard

Description: Talk about what weather is happening outside and discuss how that affects movement. Go out in rainy, snowy, windy, icy, muddy days. Have the children describe what it's like to move in those types of weather conditions. Is it easy, hard, slippery, crunchy, etc.? How does it affect their ability to play and explore?

#### Weather Trackers on the Move

- Look up, down, all around
  - Take a walk and look for evidence of different types of weather – broken off branches, downed limbs, puddles, “streams” in the dirt, etc.
- Watching the Wind
  - Can you see what direction the wind is blowing?
  - What can you observe that tells you the direction of the wind?
  - Can you tell the speed of the wind observing how the wind is affecting objects around you?
  - Compare your observation of wind speed to the Beaufort Wind Scale.



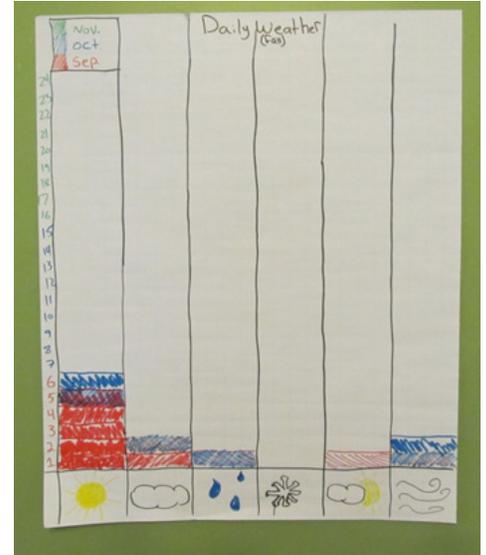
# Seasonal Cycles

**How does weather change throughout the seasons?  
What plants and animals do we see?**

## LARGE GROUP LEARNING ACTIVITIES

Bring out any data, charts, or drawings that students have collected or made about the weather in earlier investigations. Ask the children if the weather has changed since the school year began? Are you wearing the same clothes that you wore in the summer or winter?

Record the daily temperature throughout the season. Graph the temperature in a line graph to show how it changes over time. Share with them how the line shows us the hot day and the cold days. Do they remember when the very hot or very cold days were? Ask the children to show you where the warmest or coolest days were based on the height of the marks.



Generate a list of the signs of each season. What things, objects, sounds, animals, etc. do students think about when they imagine the different seasons?

Use the Weather Doll (Investigation #3) to help talk about what kinds of clothing is needed during the different seasons. Why do we need different clothing in different seasons?

Make a list of different aspects of weather that change by season and which stay the same, i.e. type of weather (sunny, cloudy, windy), temperature, amount of precipitation, type of precipitation (rain, snow, ice).

### Four Seasons Tree

Materials: construction paper, laminate, stencils.

Description: Draw and laminate a tree silhouette, preferably a maple or oak shape. Have the children make buds, green leaves, flowers, fall colored leaves, snow, to add to and remove from the tree throughout the seasons. You may choose to change your tree throughout the year based on what is happening outside OR you can fast forward the seasons with your four seasons tree. Make small trees for the children to bring home. Encourage them to change their tree at home throughout the seasons.

**Read:** *Snowy, Flowy, Blowy* by Nancy Tafuri



## SMALL GROUP LEARNING ACTIVITIES

### Seasonal Collages

Materials: Construction paper, natural materials, drawings made by students, scissors, tape.

Description: Make seasonal collages using different objects to represent the seasons—cotton for winter, brown leaves for fall, sun drawings for summer, flowers for spring, etc. Let the students come up with representative objects or use the lists you generated as a large group.

### Weather Math

Have students tally/count the number of days of each type of weather from your weather tracking activities.

## OUTDOOR LEARNING ACTIVITIES

### Weather walk

Materials: Clipboard, journals, crayons

Description: Take a weekly or bi-monthly walk with the children. Have them make “weather” journals to bring on the walks. Visit the same spot and notice how it changes over time – use drawings or descriptive words to record observations. Make sure to date each entry, note the weather and temperature for each visit. The teacher can also keep notes to remind students of what they observed during the previous outing. For an extension, have the children take the journals home and record observations about the weather at home.

### Seasonal Investigations

Materials: Clipboard, journals, crayons, camera,

Description: Notice and observe seasonal changes and signs of the season in your schoolyard. Note the changes in your journals. Add to your list of seasonal signs during circle time.

- **Shadow tracking** – find a shadow in your schoolyard that has an easily identified characteristic – corner of a building, point of a tower, top of an evergreen tree, etc. Note where the shadow falls at a specific time of day

throughout the year. Alternatively note how the shadow moves during the day.

- **Sugar on snow**

- Materials: maple syrup, clean fresh snow, pot, stove
- Description: Heat up the syrup to a high temperature in a pot on the stove. Put a thin layer of snow on a tray. Have the students describe the texture and consistency of the snow. Drip some of the hot maple syrup onto the snow. Have the students describe what happened and what is different about the snow.



# Water, water everywhere

## Where does water comes from? Where does it go?

The water cycle describes the continuous movement of water on, above, and below the surface of the Earth. Rain, snow, glaciers, fog, clouds, evaporation, condensation, rivers, lakes, streams, ground water, marshes, oceans, etc. are all part of the water cycle. All living things are also part of the water cycle as they use water during their life cycles.

### LARGE GROUP LEARNING ACTIVITIES

**Water Cycle Dance:** Explain that water changes form but it can't be made or lost. Have the children pretend to be a puddle or lake by curling up on the floor. Then explain that the sun is shining on them and heating them up. Have them wiggle and move their hands up like evaporation. Then have them move around the room as water vapor. Finally, have them clump together (condensation) with friends as clouds and when too many of them get in a clump then have them fall to the ground as precipitation. While acting out the water cycle, the children can sing, "The Water Cycle Boogie".

**SING:** Water Cycle Boogie (*make up your own simple tune*)

Evaporation, condensation, precipitation.

The water cycle boogie goes up and down.

The water cycle boogie goes all around.

### Water Cycle Model

Make a 3D Water Cycle Model based on the dramatic play above.

**Read:** *A Drop of Water* by Gordon Morrison

### Cloud in a Jar

Materials: jar, ice, warm water

Description: Fill the jar about half full of hot water. Put a piece of black paper over the top of the jar. Put ice on top of the black paper. Observe what happens. The hot water should rise and hit the cold paper and create a cloud.

**Make a Cloud** (adapted from Small Wonders)

Materials: White sponges cut into cloud shape, spoons, cups of water, bucket

Description: Hang the sponges above a bucket. Have small groups of children add spoonfuls of water onto the cloud one at a time. Count the number of spoonfuls until the cloud begins to "rain".

The sponge is a model for a cloud. Clouds are water vapor—very light water molecules. As the water molecules get heavier, it rains. When the air temperature is cold, precipitation falls as snow instead of rain.



**Rain Storm Theater:** Explain to students that you are going to act out a rainstorm. Start by having them tap one finger on their palm or snapping as the rain starts. Then have them tap with two fingers on their palm as the rain gets little harder. As the rain gets harder have them clap their hands or tap on the floor. You can cycle through these as many times as you like. Have the students close their eyes while you make your rainstorm and imagine they are outside in the rain.

**What is snow?** Snow starts out as tiny water droplets in the clouds. When it's very cold outside, the water droplets freeze into crystals. The crystals grow bigger when other water droplets touch them and they freeze together until they become snowflakes. They float in the air at first and then when they get bigger and heavier they fall to the ground. Lots and lots and lots of snowflakes make snow! Show picture of snowflakes falling from cloud and getting bigger –

**Read:** *It's Snowing!* by Gail Gibbons

### **Snowflake Match-Up Game**

Materials: Laminated snowflake cards

Description: Give each child a snowflake card. Have them move around the room and find the person that has the same snowflake card. This might be tricky because some look very similar, but are not exactly the same. You will have to look closely to tell if it's a match. Once you find your match, yell "snowball!" and then sit down.

### **Snow Songs:**

"The Snow is on the Trees" sung to the tune of "Farmer in the Dell"

*The snow is on the trees (point up)*

*The snow is on the ground (point down)*

*The snow is on the window (make window with hand)*

*The snow is all around (wave arms up over head)*

*The snow is very icy (shiver)*

*The snow is very bright (cover eyes with hands)*

*The snow is very slippery (slide one hand over the other)*

*The snow is very white!*

"Dance Like Snowflakes" sung to the tune of "Frere Jacques"

*Dance like snowflakes*

*Dance like snowflakes*

*In the air*

*In the air*

*Whirling, twirling snowflakes*

*Whirling, twirling snowflakes*

*Here and there*

*Here and there*

## **SMALL GROUP LEARNING ACTIVITIES**

### **Dropper Doodles**

Materials: Eyedropper, wax paper, tin foil, paper towels, straws, newspaper, cardstock, markers

Description: Offer children the materials and let them play with water and how it moves across or absorbs into different materials. Can they make wind to make it travel faster? Can they track the movement of the water with water-soluble markers on paper? Notice the properties of water through play. Put it all on a tray—what happens when it moves "downhill"? Take learning outside: Notice some of the same ways that water interacts in nature—traveling downhill, on different surfaces—dirt, leaves, sidewalks.

### **Epsom Salt Painting**

Materials: Epsom salt, hot water, paintbrush, thick paper

Description: Mix equal parts Epsom salt in hot water until all of the salt is dissolved. Have the children brush the mixture into poems, pictures or drawings. When the water dries it will crystallize like frost.

### **Water Cycle in the Water Table**

Materials: Pipettes, sponges, watering cans, spray bottles, water table

Description: After a discussion of the water cycle, open up the water table with the above items. Give children time to make it rain, let the water be absorbed (and re-absorbed) by the sponges. If desired, the activity can be expanded to include tubes and containers for allowing water to move from streams to ponds/lakes.



## START INSIDE, TAKE IT OUTSIDE

### Condensation Experiments

Materials: plastic wrap, jar, rubber band, coin or small object

Description: Explain that you're going to create rain inside a jar. Place the saran wrap over a jar or container and put a rubber band around it. Put a coin or other small object in the middle of the saran wrap. Leave the jar in a sunny area. Have the children predict what they think will happen. Observe to see what actually happens.

### Ice Sculptures and Structures

Materials: Different shaped ice cube trays, different shape plastic containers, small balloons, water, food coloring.

Description: Use the containers to make a variety of shapes and forms to use inside and out.

- Place water in trays or containers. Add colors to some of your containers and trays to make sculptures more colorful.
- Fill balloons with water and add a few drops of food coloring. Freeze outside if it's cold enough. Note how long it takes to freeze.
- Ask students to predict if it's a good day to make ice cubes outside. Bring your cubes and blocks outside for building and creating. Watch them melt on sunny days to make beautiful landscape color forms.
- Place a weighted cup in a cake pan or other round pan. Fill the pan with water and add colors as desired. Freeze, remove the cup, take the ice form out of the pan, and hang your ice sun catcher outside.

## OUTDOOR LEARNING ACTIVITIES

### Water Cycle Walks

After a heavy rain or even while raining, take a walk and notice where the water collects in puddles and where it forms streams. Who might use the puddles? Follow the streams. Where do the streams begin? Bring a small ball or marble and drop it at the

beginning of the stream. Does it follow the same path? Can you find the end of the stream? What do you observe there? What do you notice about the soil and rocks in and around the stream? Check the rain gauge during this investigation. Note the levels in your journals and record them on your rain chart.

**Water Cycle Landscape Theater:** Have children move through the water cycle outside by combining the dramatic play activities—Water Cycle Theater, Rain Storm Theater, Water Molecules, Dancing like a Stream, etc.

**Snow Sticks:** Use a ruler or yardstick or make your own "snow stick". Mark a scale on your stick so you can measure how much snow falls during a snow storm. Does the snow stay the same height over the time? Track how long the snow stays. On what days does it melt faster? Compare the melting rate with your daily temperature chart.

**READ:** *The Snowy Day* by Ezra Jack Keats

### Water Art

Materials: Paint Brushes, Small pieces of slate or chalkboard, buckets of water

Description: Invite the students to paint with water on their own slate or small chalkboard. How long before their painting evaporates? Does it evaporate more quickly in the sun or shade? On what kinds of days does your water art stay around longer? If you don't have small slate boards, try a light colored sidewalk!

**Comparing Snow:** Does snow always feel the same? Sometimes snow is wet, sticky, and heavy. Sometimes it is dry, fluffy, and light. This is because on warmer days the crystals are a bit melted and wet. On very cold days, the crystals freeze solid and dry. Which kind of snow is best for making snowballs?



## How does the weather affect plants and animals?

Plant life cycles have to be adjusted to the seasons. Plants grow and flower in the spring and summer, and produce seeds in the summer and fall, and then die off or go dormant in the winter. Similar to plants, animals in Massachusetts need to adapt to the wide temperature variations in our climate. Animals survive the winter through one of 3 strategies – dormancy, migration, staying active or resistance.

### LARGE GROUP LEARNING ACTIVITIES

**Spring:** Everything wakes up

Trees, plants, and animals start to get busy.

Materials: Small, pale green leaf cut outs or light green scarves

Description: Have each child 'be a tree'. Using whole body movements, their toes become the roots; body is the trunk; arms are the branches; fingers are holding the leaves. Small, pale green leaves are passed out to each child. The children will hold the new spring leaves in their fingers and 'eat the sun' – an introduction to photosynthesis.

Discuss: A tree is a habitat – a home for plants and animals. Who lives in trees? List all the animals/plants that the group mentions. Have each child think of something different. What is an animal? A creature that eats something!

What are animals doing in spring?

- Singing! Play frog songs. Have the children become a frog symphony.
- Dancing/Moving about to find food, mates, "impress" other animals. Robins move about to find food, Turkey Vultures twirl in the sky, Turkeys strut to show off, etc.

**Summer:** Family Time

Animals are taking care of their babies, plants are producing flowers that will become seeds.

Materials: Larger, green leaf cut outs or green scarves, picture of flowers with their fruit on the back

Description: Large green 'leaves' are passed out to the 'trees.' Yum, more surface areas to 'eat the sun.' Pass around pictures of flowers with their fruit pictures on the back of the card.

Discuss: Trees are homes for baby animals such as birds and squirrels. What other animals might be active in the forest at this time of year?

**Fall:** Get ready! The Cold is Coming!

Time to get your cold weather clothes on.



Materials: Red, orange, brown, yellow leaves, pine needles, seeds, feathers

Description: Pass out orange, brown, yellow, red leaves to the 'trees.' It's time to think about cold weather – you might freeze, if you stay green. Pass out pine needles as well so that each 'tree' has pine needles and flat 'leaves.' Have the students drop their deciduous leaves since they will freeze in cold weather. Have the students study the pine needles--why wouldn't they freeze?

Pass around seeds. This is the time of year when plants drop their seeds so they are ready to grow in the spring. Look at different seeds and think about how they are ready to survive the cold winter.

Pass around feathers. How do feather help birds besides flying? What do other animals need to do to get ready for winter? Talk about animals that grow thicker fur or store extra layers of fat. Some animals go to sleep for the winter and some go where it is warmer. Ask the children what they do to get ready for winter? Do they have any relatives that "migrate"?

**Winter:** Brrrr. It's all about Survival!  
How do you survive in the cold?

Materials: Pine Needles

Description: Have half of the 'trees' hold up their needles and the other half holds up empty "branches".

Discuss what it looks like outside—are some of the trees outside "taking a rest" or "dormant"? What do the animals do? Some take a vacation (migrate)—have students swirl away to Florida as a Turkey Vulture. Some animals like winter and deal with the cold by growing thicker fur like the raccoon or skunk. Like us, they go in their dens to warm up during stormy, winter weather. Some animals go into a deep sleep (hibernate) like the woodchuck or brumate like the box turtle.

Reflect together on the life of the trees through the year. Design a bulletin board with the children about the trees through the seasons. As you explore outside, add new plants and animals to the seasons.

**Read:** *The Busy Tree* by Jennifer Ward and Lisa Falkenstern

### What Season Is It?

Materials: Pictures of a deciduous tree (maple, oak, etc) during every season. Have photos of the whole tree as well as close-ups of the limbs, buds, leaves... depending on the season.

Description: Ask the students to guess which season each tree represents. How did they know which season? Discuss how trees adapt to the changing seasons just like we do. Bring out this activity throughout the year and follow it up close observation of a tree in your schoolyard.

### Water for Plants

Materials: celery stalks, cups of water, food coloring

Description: Have the children help to put a stalk of celery and food coloring in a cup with lots of water, very little water or a medium amount of water. A few days later observe what happened to the leaves of the celery. Some will have wilted due to lack of water and some will still be growing. How are plants affected when we have lots of rain? How are they affected when we don't get rain for a long time?

### Winter Twigs—Be a Tree Fantasy (from *Hands-On Nature*, pp. 163)

### Coping with the Cold

(Excerpt from *Project Seasons*, p. 145-148)

### Landmark Migration Game

Materials: large construction paper shapes placed around the room

Directions: Tape large construction shapes at various places around the school or room. Talk about what the name of each shape is for a math connection. Explain to the children that they are going to pretend to be birds migrating south for the winter. Remind them to use walking feet. Tell them a certain shape to migrate to and choose one child to lead the flock to that landmark. Afterwards have the children create maps with sticker shapes of the path to follow on a piece of paper.



## The Long Trip

Materials: backpack filled with items people take along when traveling – food, jacket, photo of family (to indicate traveling with people vs traveling alone), map, compass

Description: Migration is a journey that animals take at a certain time each year or a certain time in their adult lives. Migrations have patterns, which generally happen over and over again. What are some patterns in our lives? What are things that we do over and over? The animals that we see migrating most often are birds. Try flying like different birds that migrate. Stand up and stretch out your wings. First fly like Canada Geese that have to flap their wings continuously while they fly. Other birds flap a few times and then glide; flap and glide over and over. Finally, be like hawks that only flap every once in a while and mostly soar the entire way. Stretch your wings out and soar through the air.

How does an animal “pack” for its trip? Take out the backpack. Ask the students to pretend they are taking a trip. What sorts of things would be bring? Food: we can take some with us or buy it while we’re traveling. Animals can’t go to the store so they “store” it by eating lots and lots before the trip starts. So gobble up lots of food to get ready for your journey. Some eat during the trip too, like we do. Warm clothes: Can an animal bring a jacket? No, but its stored fat can help keep it warm. Do you go on trips by yourself or with your family? Migrating animals usually travel in a group for protection and even warmth. Ask the children where they would like to “migrate” to today on their outdoor explorations?

**Read:** *Over and Under the Snow* by Kate Messner  
*The Busy Little Squirrel* by Nancy Tafuri

## SMALL GROUP LEARNING ACTIVITIES

**What’s Up Bud?** Make clippings and dissect buds of different trees and shrubs. You can cut down the center to reveal what’s inside or gently peel back the scales.

## Insulation Experiments

Materials: half liter soda bottles, insulating materials – felt, wool, cotton, fleece, etc

Description: Explain that you’re going to see what happens to the temperature of water if you leave it inside a variety of materials over time. Take the temperature of the water at the beginning. Have the children predict which material will keep the water warm the longest. Put the bottles wrapped in a variety of materials outside. Check them every 5-10 minutes and take the temperature to see how much it has changed. Make a chart of the changes in temperatures and compare the results for each bottle.

## Flying South

Materials: index cards with a variety of ways in which to move from place to place

Description: Explain that as birds migrate a variety of events can occur and that you’re going to act them out. Have a stack of cards with the following events that could happen to a bird during migration:

- Find a bush with many berries run forward for ten seconds.
- Get lost in the fog spin around 3 times.
- Mountain is in your way. Stop for 5 seconds.
- Winter storm. Roost in a tree for 6 seconds.
- Find a field with lots of tasty bugs. Skip forward 5 times.

Eventually reach a place which you consider to be south and have a snack and a rest.

## OUTDOOR LEARNING ACTIVITIES

### Squirrel it Away

Materials: acorns or pinecones or any small manipulative

Description: Have the children sit in a circle and have them pretend to be squirrels. Give them each a few “nuts” to go and hide all in the same place and then return to where they are sitting. You then pretend to be a hungry raccoon that is searching for food and find most of the nuts that had been hidden. Have the children go look where they had hidden their nuts to see if they are still there.



Repeat the activity but have the children each hide their nut in a separate place. Again pretend to a hungry raccoon and find a few of the places. Have the children go see how many were eaten. Compare this number to the number you had the first time.

Grey squirrels hide one nut at a time so less are eaten by other animals, but they have to remember where they hid them. Red squirrels hide their nuts all together but then they have to defend them so other animals won't eat them.

**Bursting Buds:** Find a tree close to your school that you can visit regularly. Visit in winter to notice the buds. Remind the students that the spring leaves are tightly packed in the bud and protected until spring arrives. Flag the tree so you can visit it regularly until the buds swell and open, revealing the new leaves.

**Twig Treats:** Look for evidence of deer and rabbit browsing on shrubs in your schoolyard.

**Dressing for the Weather:** Make observations about what we are wearing when we go outside.

**Signs of the Season:** Look for signs of seasonally related behavior from animals—storing food, migrating, burrows, nests, etc.



## CHILDREN'S BIBLIOGRAPHY

# RESOURCES: WEATHER

Title	Author	Description
<i>What Will the Weather Be?</i>	Lynda DeWitt and Carolyn Croll	A good introduction to weather words and concept to open a class discussion.
<i>Snowy, Flowy, Blowy</i>	Nancy Tafuri	A book in verse about weather from month to month.
<i>Weather</i>	Mike Goldsmith and John Butler	A book to answer common questions that children have about weather.
<i>The Sun, the Wind and the Rain</i>	Lisa Westberg Peters	A child builds a mountain out of sand and learns how weather affects mountains.
<i>Oh Can You Say What's the Weather Today?</i>	Tish Rabe	A "cat in the hat" adventure about weather phenomena.
<i>Wild Weather Soup</i>	Caroline Formby	An early literacy book about Winifred Weathervane.
<i>The Falling Raindrop</i>	Neil Johnson and Joel Chin	Through the story of a rain drop, learn the science of the water cycle.
<i>Thunder Cake</i>	Patricia Polacco	By making Thundercake, a grandmother helps her granddaughter face her fear of an impending storm.
<i>When Rain Falls</i>	Melissa Stewart	We go inside, but what do all of the different animals do when it rains and storms?
<i>A Drop of Water</i>	Gordon Morrison	A drop of water from a child's fingertip—where does it go and what does this mean for all living things?
<i>Come on, Rain!</i>	Karen Hesse	The renewing experience of a downpour after summer heat wave.
<i>Shadows and Reflections</i>	Tana Hoban	An imaginative, wordless book of photographs of shadows and reflections.
<i>My Shadow</i>	Robert Louis Stevenson	A traditional favorite about a child playing with his shadow.
<i>Shadow</i>	Suzy Lee	Creative illustrations celebrate imagination and the shadows created with the click of a lightbulb.



<i>Shadow Chasers</i>	Elly MacKay	Shadow play as the evening paints the summer sky.
<i>It looked like Spilt Milk</i>	Charles Shaw	Like clouds, white shapes silhouetted on a blue background keep children creatively guessing.
<i>Little Cloud and Lady Wind</i>	Toni Morrison and Slade Morrison	A re-telling of a classic story of independence and working together.
<i>The Little Cloud</i>	Eric Carle	The little cloud likes making shapes on his own, but also with other clouds. Inspires cloud gazing!
<i>The Cloud Book</i>	Tomie DePaola	Introduces common types of clouds and the types of weather associated with them.
<i>I am Water</i>	Jean Marzollo and Judith Moffatt	A celebration of the beauty and usefulness of water.
<i>All the Water in the World</i>	George Ella Lyon	A fantastic read aloud book about the water cycle with beautiful illustrations.
<i>Snow</i>	Melvin and Gilda Berger	A great scholastic book about snow.
<i>The Snowy Day</i>	Ezra Jack Keats	A classic story about a child's day exploring snow in the city and coming back home.
<i>White Snow, Bright Snow</i>	Alvin Tresselt	The wonder and delight of snowfall.
<i>Katy and the Big Snow</i>	Virginia Lee Burton	Katy is a strong tractor who pushes the snowplow in the winter, making it possible for all of the townspeople to do their jobs.
<i>In the Snow: Who's been Here?</i>	Lindsay Barrett George	It's quiet on a hike through the snow, but animal signs are everywhere. Help find them!
<i>Snow</i>	Cynthia Rylant	A book about children loving snow and all of the fun they have playing in it.
<i>Sunbread</i>	Elisa Kleven	Using sun to make bread brings everyone in town together. Includes a recipe for making your own sun-bread.



<i>Why the Sun and the Moon Live in the Sky</i>	Elphinstone Dayrell and Blair Lent	Sun and his wife, the moon, lived on Earth and built a large house so that the water people could visit. But so many poured in that they were forced to move to the sky.
<i>Aunt Minnie and the Twister</i>	Mary Skillings Prigger	Aunt Minnie and her nine nieces and nephews stay busy all year long. When a twister comes and turns everything topsy-turvy, she knows just what to do.
<i>Feel the Wind</i>	Arthur Dorros	Where do you feel and see the wind? Read about the ways wind affects the world around us.
<i>When the Wind Stops</i>	Charlotte Zolotow	When a little boy asks this question at the end of a happy day, his mother explains that the wind does not stop-it blows away to make the trees dance somewhere else.
<i>Bag in the Wind</i>	Ted Kooser	A poetic book about the journey of a plastic bag from a landfill through the lives of the townspeople it passes by.



# NOTES



