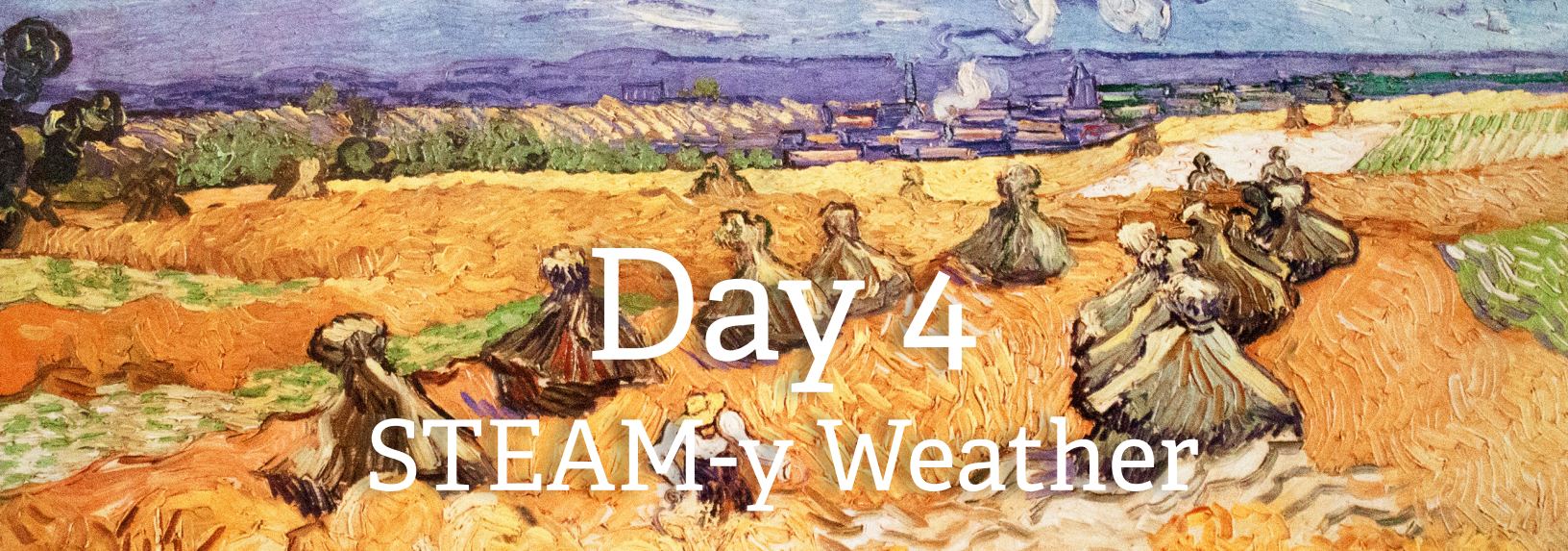


Day 4

STEAM-y Weather





Wheat Stacks with Reaper by Vincent van Gogh (1888)

Introduction

People use science, technology, engineering, and math (STEM) ideas and skills to create homes, transportation, clothes, and even food that is suited to the weather where they live. The arts — humanities, language arts, dance, drama, music, visual arts, design, and new media — help advance STEM ideas. When you add art to STEM, you get STEAM!

Sometimes people say “necessity is the mother of invention.” That means that people create things to solve problems. Weather, seasons, and climate shape how we live — and inspire us. Weather influences what kinds of houses people build, how they get from place to place, what they wear, and even what they eat!

Weather also inspires art and culture, too. Music, dance, paintings, poems, stories, and even movies are inspired by weather. People all over the world can relate to weather-inspired art and activities because weather is a universal experience.

This day focuses on how both engineers and artists kids find inspiration for their work in the weather and how it affects their day-to-day lives and how kids can do the same.

Questions to guide explorations and experiments

- What is inspiration?
- How does the weather make you feel? How does rain, sunshine, wind, or snow make you feel?
- Can you think of any stories, music, dances, art, or movies that are about weather or seasons?

- What connections do you see between art, science, engineering, and weather?
- How does the weather affect how you get to school or what you wear?
- How does the weather or climate affect your favorite activities like sports or gardening?
- How does where you live, and the weather, affect what you eat? Your home? How you get around?

Books and activities

- **Books:** about weather in art and culture, stories inspired by weather, and weather-inspired design and engineering
- **Activities:** understanding how weather and climate influence and inspire design and invention; designing a house, transportation, or clothing based on the weather or climate; creating art inspired by the weather





Fiction

- *Bringing the Rain to Kapiti Plain* by Vera Aardea (Ages 6-9)
- *The Cloud Spinner* by Michael Catchpool (Ages 4-8)
- *Hurricane* by David Wiesner (Ages 6-9)
- *Iggly Peck, Architect* by Andrea Beaty (Ages 4-8)
- *It Looked Like Spilt Milk* by George Shaw (Ages 4-8)
- *Kate, Who Tamed the Wind* by Liz Garton Scanlon (Ages 3-8)
- *Kissimmee Pete and the Hurricane* by Jan Day (Ages 4-8)
- *Little Cloud and Lady Wind* by Toni Morrison (Ages 6-9)
- *Little Cloud* by Eric Carle (Ages 3-6)
- *Mad Scientist Academy: The Weather Disaster* by Matthew McElligott (Ages 6-9)
- *Min Makes a Machine* by Emily Arnold McCully (Ages 3-8)
- *Mirandy and Brother Wind* by Pat McKissack (Ages 6-9)
- *Singing in the Rain* by Arthur Freed (Ages 4-8)
- *The Snow Dancer* by Addie K. Boswell (Ages 4-8)
- *Thunderstorm Dancing* by Katrina Germein (Ages 4-8)
- *Persephone* by Sally Pomme Clayton (Ages 8-12)
- *Rain* by Sam Usher (Ages 3-6)
- *The Rain Train* by Elena De Roo (Ages 3-6)
- *Rosie Revere, Engineer* by Andrea Beaty (Ages 4-8)
- *Sector 7* by David Wiesner (Ages 6-9)
- *Snow* by Sam Usher (Ages 3-6)
- *Storm* by Sam Usher (Ages 3-6)
- *Sun* by Sam Usher (Ages 3-6)
- *Thunder Rose* by Jerdine Nelson (Ages 6-9)
- *Walter Was Worried* by Laura Vaccaro Seeger (Ages 4-8)
- *The Weather's Bet* by Ed Young (Ages 6-9)
- *Winter's Child* by Angela McAllister (Ages 3-7)



Poetry

- *Dreaming Up: A Celebration of Building* by Christy Hale (Ages 4-10)
- *Stopping by Woods on a Snowy Evening* by Robert Frost (Ages 3-9)

Nonfiction

- *Boy, Were We Wrong About Weather!* by Kathleen V. Kudlinski (Ages 6-9)
- *The Boy Who Harnessed the Wind* by William Kamkwamba and Bryan Mealer (Ages 6-9)
- *Bread, Bread, Bread* by Ann Morris (Ages 4-8)
- *Disaster-Proof* by Robin Koontz (Ages 9-12)
- *Engineering for Floods* by Samantha Bell (9-12)
- *Engineering for Hurricanes* by Wendy Hinote Lanier (Ages 9-12)
- *Extreme Snow Vehicles* by Ian F. Mahaney (Ages 8-12)
- *From Here to There* by Robin Koontz (Ages 9-12)
- *Groundhog Day* by Gail Gibbons (Ages 4-8)
- *Hats, Hats, Hats* by Ann Morris (Ages 4-8)
- *A House Gives Shelter* by Kylie Burns (Ages 8-12)
- *Houses and Homes* by Ann Morris (Ages 4-8)
- *How Artists See the Weather: Sun, Rain, Wind, Snow* by Colleen Carroll (Ages 6-9)
- *I, Matthew Henson: Polar Explorer* by Carol Boston Weatherford (Ages 9-12)
- *If You Lived Here: Houses of the World* by Giles Laroche (Ages 3-7)
- *The Legend of Lightning and Thunder* by Paula Ikuutag Rumbolt (Ages 6-9)
- *On the Go* by Ann Morris (Ages 4-8)
- *On the Same Day in March* by Marilyn Singer (Ages 5-7)
- *Shoes, Shoes, Shoes* by Ann Morris (Ages 4-8)
- *Snowflake Bentley* by Jacqueline Briggs Martin (Ages 4-8)
- *Staying Warm, Keeping Cool* by Linden McNeilly (Ages 9-12)
- *Sugaring Time* by Kathryn Lasky (Ages 8-12)
- *Weather Legends* by Carole G. Vogel (Ages 10 and up)
- *Weather Robots* by Christine Zuchora-Walske (Ages 6-9)



Activity 1: Weather-Inspired Design

4

Introduction

Weather and climate inspire all kinds of invention and innovation. From the first cold person in the 12th century who decided to build a chimney to have fire more safely warm his home to recent innovators improving upon the electric car, weather and climate are important factors in how many items that we use every day were developed.

With this activity, kids can look to the weather and climate to inspire new innovations and design a house, a form of transportation, or a piece of clothing that is specifically suited to a certain kind of weather or climate.

Supplies

- paper
- pencils and markers
- resources to research homes, transportation, and clothing used in various climates
- supplies for building models such as cardboard boxes, bottle caps, plastic bottles or containers, aluminum foil, balsa wood, glue, tape, fabric scraps, yarn, ribbon, etc.





Activity 1: Weather-Inspired Design

4

Get kids thinking ...

Start by asking a couple of questions:

- What does a house need to be a comfortable, safe house?
- What do people need in a form of transportation? A seat? Storage space? A way to move over the ground easily?
- What kinds of clothes do people need to be comfortable where they live?

The answers often depend on where people live and the weather conditions they experience.

Have kids brainstorm features that all houses, all forms of transportation, and all clothes need, regardless of weather or climate. For example, a house needs a roof, floors, walls, doors and/or windows, a place to sleep, etc. Forms of transportation can be for one person or more, but they need to move people, and sometimes their things, through the environment safely and efficiently. Clothes need to fit and keep a person comfortable.

Read *The Boy Who Harnessed the Wind* and talk about how William used what his climate had: wind, and science, technology, and engineering to solve a problem. Read *Hats, Hats, Hats* and talk about how hats worn in different climates have different features. Share *Houses and Homes* and *On the Go* to show homes and transportation in different climates.

Explore transportation and homes around the world

Peculiar Transport Around the World

<https://youtu.be/hVJOyy-ooH8>

Little Human Planet — Homes Around the World

<https://www.teachertube.com/videos/little-human-planet-homes-around-the-world-386131>



Activity 1: Weather-Inspired Design

4

Let's get started!

As a group, either choose a type of weather or climate that is inspiring kids' designs — or have the group decide on what they'll design: a house, a form of transportation, or a piece of clothing. If the group selects a type of weather, then each kid can choose what to design. If the group chooses a certain thing to design, then each kid can choose the kind of weather or climate to design their thing for.

Either way, the challenge the weather presents is the problem to be solved!

Step 1: Invite the kids to brainstorm ways weather or climate impacts how people design and build their houses, what kind of transportation they use, or the clothes they wear. For example, if they live in a place with heavy rain or flooding, they may build their house on stilts! And they may get around in a boat instead of on a bike or by foot. Give them different weather conditions or climates to brainstorm for: hot and dry/desert, blizzards or lots of snow and ice, rain or flooding, high winds, etc.



Step 2: Provide ways for kids to research the weather or climate and design choices for what they are designing — house, transport, or clothing — such as picture books, reference books, magazines, or internet access.

Step 3: Invite the kids to draw their design for a house, transport, or piece of clothing for their weather or climate and label it with details about how it works.

Step 4: Support them as they make a model with the materials provided.

Ask kids to share what they've made and point out how weather and climate influenced and inspired the design of their item.



Activity 1: Weather-Inspired Design

4

More weather-inspired engineering design activities

Construct and Test Roofs for Different Climates

https://www.teachengineering.org/activities/view/roofs_for_different_climates

Simple Snow Load Roof Model Demo: Which Roof Is Tops?

https://www.teachengineering.org/activities/view/which_roof_is_tops

What to Wear and Drink? Weather Patterns and Climatic Regions

https://www.teachengineering.org/lessons/view/cub_earth_lesson3



Page spread from: *The Boy Who Harnessed the Wind* by William Kamkwamba and Bryan Mealer, illustrated by Elizabeth Zunon



Activity 2: Weather-Inspired Art

4

Introduction

Artists share their unique ways of seeing things through their depictions of our world. In how they capture light and weather, artists may be giving glimpses of how the world looks to them, but may also be portraying moods or emotions — or making a record of a specific moment in time.

With this activity, kids can get inspired by other art and artists, form an appreciation of an artist's vision and their approach to a theme, and create their own artistic representations of weather, wind, sun, and skies.

Supplies

- paper
- pencils or markers
- other materials for creating art such as paints and brushes, crayons, pastels, modeling clay, scissors, glue, found items for making a sculpture, etc.
- photos or videos of different weather conditions

Get kids thinking ...

Prompt discussion about how artists express their feelings and ideas. **Ask kids:**

- Do you have a favorite season or kind of weather? How does it make you feel?
- Have you ever seen a painting or drawing that shows some kind of weather? Or heard a poem, story, or music about a weather event or a season? What feeling or meaning did the artist capture in their work? What story are they trying to tell?

Let's get started!

Start with a book such as *How Artists See the Weather: Sun, Rain, Wind, Snow* by Colleen Carroll and then have kids explore some other examples of art inspired by weather:



Activity 2: Weather-Inspired Art

4

The Weather Artist: Chasing Storms With Sculpture

<https://youtu.be/1ES4Ds7ApQw>

Nathalie Miebach: The Water Line

<https://youtu.be/KUtbOmCp1HI>

Excerpts from Virtual Tour of Weather Report

<https://youtu.be/NR69IgiOFXc>

10 great works of art depicting snow

<https://www.bbc.com/culture/article/20151218-ten-great-works-of-art-depicting-snow>

Astounding Weather-Inspired Art Installations

<https://weather.com/travel/news/uk-weather-inspired-art-20130426>

Tate Museum: Weather and Art

<https://www.tate.org.uk/art/student-resource/exam-help/weather>

<https://www.tate.org.uk/art/weather-and-art>

The Nutcracker — The Waltz of the Snowflakes

https://youtu.be/UYalQNjAX_8

Step 1: As you share and discuss various works of art, get kids thinking about how artists use colors, textures, shapes, and different materials in their art to show something about weather or seasons. Ask them to point out what they see in the examples you share.

Step 2: Talk with kids about the kinds of materials you have available to use to make a piece of art. Get them brainstorming how they could use the different materials to show some aspect of weather or how different kinds of weather make them feel.

Step 3: Invite kids to create a piece of visual art — painting, drawing, or sculpture — that shows or reflects a kind of weather or season. It can be representational — showing the subject as it





Activity 2: Weather-Inspired Art

4

might be seen. Or it can be abstract — showing not the actual weather or season, but how the artist feels or thinks about the subject.

Step 4: Have kids work together to set up a weather-themed art show. Help “kid curators” understand how they can display their art to its best advantage, develop artist statements for their works, and create an experience for others to learn from and enjoy.



More arts and weather activities

Help kids get to know more about tornadoes with these online interactive activities:

Weather: Noticing Feelings

<https://www.place2be.org.uk/media/8d97464e92adf74/art-room-weather-project.pdf>

Patterns in the Sky

<https://www.stemmaterials.org/wp-content/uploads/2019/07/PatternsintheSky.pdf>



Activity 2: Weather-Inspired Art

4

Making Weather Predictions

<https://ackland.org/wp-content/uploads/sites/1075/2021/04/Making-Weather-Predictions.pdf>

Weather or Not

<https://new.artsmia.org/programs/teachers-and-students/teaching-the-arts/five-ideas/weather-or-not>

Exploring Weather

<https://www.kennedy-center.org/education/resources-for-educators/classroom-resources/lessons-and-activities/lessons/3-5/exploring-weather/>

Watching the weather

<https://artuk.org/learn/learning-resources/watching-the-weather>

Inventing Art

<https://www.pbslearningmedia.org/resource/pinka18-arts-bestpresent-lp/best-pink-present-lesson-plan-pinkalicious-peterrific/>



Hunters in the Snow by Pieter Bruegel (1565)



Activity 3: Climate Check! Climate & Technology Scavenger Hunt

4

Introduction

Throughout history, people and communities have adjusted to and dealt with changes in climate and extreme weather. To solve problems that people experience due to climate or weather, humans have often turned to science and technology in developing **adaptations**.

In this activity, kids think about and look for evidence of some of the ways that humans have altered their environments to help them survive all kinds of weather and climates.

Supplies

- pencils
- Weather Journal
- books, atlases, newspapers, magazines, and/or internet access for information about your World Weather Wise location
- markers, crayons, or colored pencils
- cameras or smart phones — for Community Connection
- clip boards (optional)
- ability to print photos taken (optional)

Get kids thinking ...

Kids may not have noticed but weather or climate have inspired or influenced design or infrastructure in their neighborhood. Get them thinking and talking about the challenges or advantages of living in a rainy or very hot or very cold climate.

Share that people come up with lots of ways to live successfully in their climate using science and technology to build climate-appropriate places to live and ways to get around. Read *If You Lived Here: Houses of the World*, *Building Up*, or *Houses and Homes* and talk about ways people build their houses to suit the climate. Read *On the Go* and talk about how climate impacts transportation.



Activity 3: Climate Check! Climate & Technology Scavenger Hunt

Let's get started!

Invite kids to work in small groups to research how people use science, technology, design, and engineering to adapt to their climates in your World Weather Wise location. Have them look for the following things:

- **Building construction:** What do the buildings have to help take advantage of or with this location's climate? What kind of building materials are used? What kinds of design is used for roofs, windows, doors, or porches?
- **Transportation:** How do people get around? What kinds of vehicles do they use? How are these vehicles suited or not suited to the climate? What kinds of infrastructure (roads, ports, railroads) make transportation possible?
- **Other climate adaptations:** Are shade trees and solar panels in use if this is a hot, sunny climate? How do people stay warm in cold climates? Does the climate affect how people get energy?

Have kids make a list and draw examples of how people use science, technology, engineering, and design to adapt to their climate. Invite them to share and compare examples they've found.





Activity 3: Climate Check! Climate & Technology Scavenger Hunt

Community connection

Head outside and ask kids to look around their own neighborhood for ways people have adapted to their climate. Have them note the evidence they find in a list of what they see along with examples they draw or photographs they take.

Looking at the information they have collected about the climate and climate adaptations in their World Weather Wise location and in their own neighborhood, ask kids to compare and contrast the two locations and write about which location they would prefer and why.

More climate exploration activities

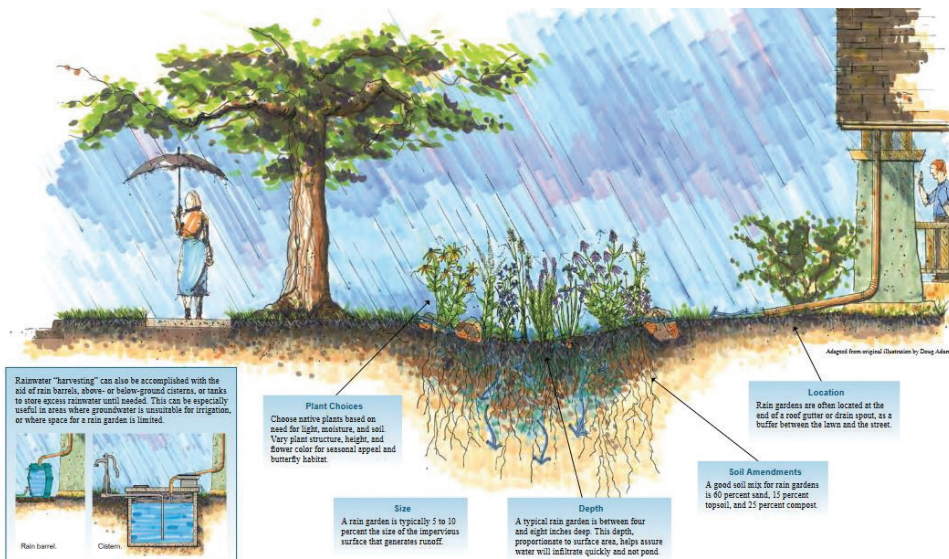
Help kids get to know more about getting prepared for weather and climate change with these online interactive activities:

Climates! It's All in the Data

<https://seagrant.who.edu/k-12/lesson-landing/climates/>

Write a Climate Solutions Song

<https://subjecttoclimate.org/resource/write-a-climate-solutions-song>





WEATHER WALK

4

Take kids outside to observe the weather. After the **Daily Data Collection** and **Sky Sketch**, talk with kids about how climate change is causing more extreme weather events around the world.

Then take a walk around the neighborhood to see if they see any evidence of a changing climate. For example, is the ground hard and baked from drought? Are plants withered from lack of rain? Are water levels in streams, rivers, and lakes high from flooding or low from drought? Is there burned or scarred land from a fire? Are there birds that have migrated to your community earlier than usual?

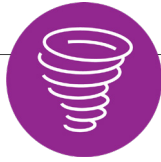
What do they notice about how their community is adapting to the changing climate? What are people wearing? How do they get from one place to another? Is there evidence of how the community deals with extreme weather events?

Follow up on your **World Weather Wise** activity. Discuss how the climate in this location might be changing experiences and how they can tell. Can they see or imagine how weather or climate has influenced design or infrastructure there?

Research how weather inspires design and creativity in their World Weather Wise location. Have kids write down their observations and what they've discovered through research in their **Weather Journals**.

If you have the opportunity, take the kids outside more than once during the day to observe how the weather changes.

Repeat the Daily Weather Walk every day.



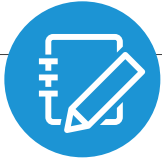
Weather the obstacles

Get kids hopping, jumping, spinning, balancing, marching, dancing, and zigzagging when they follow the chalk path of your weather obstacle course! On the sidewalk or in an empty, secure parking lot, use sidewalk chalk to draw a course for kids to follow that could include:

- **Gathering clouds:** Have kids pick up a cotton ball with a spoon and follow the “wind” you’ve drawn without dropping it until they reach the “storm front” basket to deposit it
- **Zigzagging with lightning:** Kids have to move quickly along the zigs and zags of the long lightning bolt you’ve drawn.
- **Sounding the weather warning:** Have a bell for kids to ring to let everyone know severe weather is on the way.
- **Splashing down:** Kids jump with two feet through a series of “puddles” you’ve drawn.
- **Spiraling with the tornado:** Kids twist and turn as they follow the lines of a cone-shaped funnel from its largest to smallest point.
- **Leaping over the mud puddle:** Kids jump over a “puddle” you’ve drawn.
- **Going over the rainbow:** Kids can step over a rainbow you’ve drawn or over several arced pool noodles.

Kids can contribute too! Ask for their weather-themed obstacle course suggestions or let them design and build a course of their own.





Legendary weather

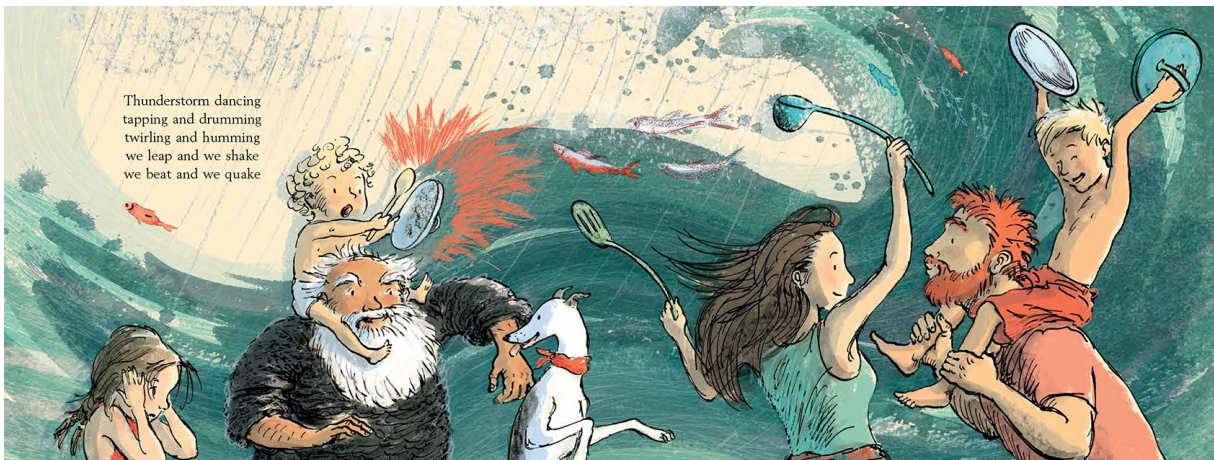
Have kids read myths or legends about weather such as Norse myths about Thor, the god of thunder, or Persephone, goddess of the harvest. Or try *Bringing the Rain to Kapiti Plain*, which explains how a boy ends a drought by shooting a cloud with his arrow, or *Thunder Rose*. Discuss with kids how people in cultures around the world created stories to explain weather events and seasonal changes. Invite them to choose a weather episode, like a snow storm, tornado, or a windy day and write their own story that explains why this kind of weather happens.

It all “ads” up

Invite kids to brainstorm inventions (existing or new) that help with a situation or solve a problem caused by weather and climate. What do they know about why we have windshield wipers? What if there was a special hat that became an umbrella when it started raining? Have them choose an existing invention or create an idea for an invention and then have them write about it in great detail — what it is made from, its origin, how it works, and what it does. Then have them use that information to create an advertisement about their real or imaginary invention.

Action weather

In books like *Thunderstorm Dancing* and *Sun*, the weather forces the action of the characters. Have kids write their own story where weather plays a role in determining what the characters do or don't do.



Page spread from *Thunderstorm Dancing* by Katrina Germein, illustrated by Judy Watson



Apps

Tinkergarten OutdoorLearning App \$

<https://www2.tinkergarten.com/>

Online games

Don't Flood the Fidgets game

https://pbskids.org/designsquad/games/dont_flood/

Websites

Engineering Girl

<https://www.engineergirl.org/>

PBS KIDS Plum Landing science exploration

<https://pbskids.org/plumlanding/>

James Dyson Foundation engineering for kids

<https://www.jamesdysonfoundation.com/>

Girl Scouts activities for STEM, outdoors, earth day, climate

<https://www.girlscouts.org/en/activity-zone/grade-levels/all-ages-levels-badge-activities.html>

National Gallery of Art for Families

<https://www.nga.gov/learn/families.html>

The Tate Gallery for Kids

<https://www.tate.org.uk/kids>

Chrome Music Lab experiments

<https://musiclab.chromeexperiments.com/Experiments>



Video

New ways to stand up to floods, wildfires, earthquakes and HAZMAT disasters

<https://youtu.be/jkkPN-w37zc>

How we can adapt to climate change — all over the world

<https://youtu.be/SLluDOD8HL0>

Exploring the Natural World through Weather: A Look at Georges Schreiber's Spring Storm

<https://vimeo.com/531393077>



Spring Storm (lithograph) by Georges Schreiber (1943)