



Weather and Seasons: Kindergarten

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Standards

NVACS – Science Standards

* K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time.
* K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
* K-PS3-1: Make observations to determine the effect of sunlight on Earth’s surface.
* K-PS3-2: Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

Math:

* MP.2 Reason abstractly and quantitatively.
* MP.4 Model with mathematics.

Engineering:

* K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
* K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
* K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Literacy:

* RI.K.1 With prompting and support, ask and answer questions about key details in a text.
* W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them.)
* SL.K.1: Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
* SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
* SL.K.5: Add drawings or other visual displays to descriptions as desired to provide additional detail.
* L.K.1a: Print many upper- and lowercase letters.
* L.K.1f: Produce and expand complete sentences in shared language activities.

Materials

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Qty.** |  | **Item** | **Qty.** |
| Computer | 1 |  | BrainPOP jr. Login  |
| Science notebooks | Class set (30) |  | Computers or tablets for class use (optional)  | Class set (30) |
| White boards | Class set (30) |  | White board markers | Class set (30) |
| Pencils | Class set (30) |  | Thermometer | 1 |
| Glass bottles  | Class set (30) |  | Rubbing alcohol | 5 bottles |
| Plastic measuring cups | Class set (30) |  | Funnels | Class set (30) |
| Food coloring | 10 bottles |  | Modeling clay | 10 lbs. |
| Clear straws | Class set (30) |  | Yogurt containers with lids | Class set (30) |
| Sand | 5 lbs. |  | Sharpened pencils | Class set (30) |
| Drinking straws | 2 class sets (60) |  | Straight pins | Class set (30) |
| Poster board | 2 |  | Sharpie | 10 |
| Compass | 1 |  | Paper plates | Class set (30) |
| Rulers | Class set (30) |  | Fan | 1 |
| Pinwheel | 1 |  | Rain gauge | 1 |
| Clear 2-liter bottles | 2 class sets (60) |  | Pebbles | 2 lbs. |
| Clear tape | 5 rolls |  | Markers | Class set (30) |
| Rulers | Class set (30) |  | Spray bottles | 5 |
| Chart paper | 1 pad |  | Shaving cream | 10 bottles |
| Clear jars | Class set (30) |  | Blue food coloring | 5 |
| Pipettes | Class set (30) |  | Scissors | Class set (30) |
| Styrofoam | 1 large sheet |  | Masking tape | 5 rolls |
| Aluminum pie tin | 5 |  | Large clear bowls | 6 |
| Stir sticks | 1 box |  | Clear 1-liter bottles | 2 Class sets (60) |
| Washers | Class set (30) |  | Duct tape | 2 rolls |
| Twister tube (optional) | Class set (30) |  | Colored lamp oil | 1 bottle |
| Small milk cartons | Class set (30) |  | Craft sticks | 1 box |
| Styrofoam cups | Class set (30) |  | Paper clips | 1 box |
| Rubber bands | 1 bag |  | Large plastic tubs | 5 |
| Cotton balls | 5 bags |  | Stopwatch  | 1 |
| White paper | 1 ream |  | Black paper | 1 ream |
| Pictures of trees without leaves | Class set (30) |  | Glue | Class set (30) |
| Tissue paper (white, pink, green, red, orange, yellow) | 3 packages each |  | Glass jars with lids | Class set (30) |
| Hairspray | 5 cans |  | Kettle | 1 |
| Whole milk | 5 gallons |  | Sugar | 10 lbs. |
| Vanilla | 5 bottles |  | Rock salt | 5 lbs. |
| Chocolate chips | 3 bags |  | Sprinkles | 3 jars |
| Oreo cookies | 5 bags |  | 2-quart freezer bags | Class set (30) |
| Gallon freezer bags | Class set (30) |  | Measuring spoons | 1 set |
| Chocolate powder | 1 container |  | Hand towels | Class set (30) |
| Spoons | Class set (30) |  | Bowls | Class set (30) |
| Ice cream scoop | 1 |  | Coins | Class set (30) |
| Crayons | Class set (30) |  | Cardstock | 1 ream |
| Baking soda | 10 boxes |  | Vinegar | 10 bottles |
| Snow glitter | 2 containers |  | Peppermint extract | 2 bottles |
| Sandwich bags | 2 class sets (60) |  | Heat lamp | 1 |
| Black construction paper (9x12) | 1 ream |  | White construction paper (9x12) | 1 ream |
| Popsicle sticks | 1 box |  | Tongue depressors | 1 box |

Books

(with myON links, if available)

If It’s Really Cold….and Other Weather Predictions by Blake Hoena: <https://www.myon.com/reader/index.html?a=ib_cold_f12>

Forecasting Weather by Terri Sievert: <https://www.myon.com/reader/index.html?a=ess_fweat_f11>

Temperature Heating Up and Cooling Down by Darlene Stille: <https://www.myon.com/reader/index.html?a=as_tempe_s04>

The Pool Party by Marcie Aboff: <https://www.myon.com/reader/index.html?a=kr_pool_s08>

Wind by Erin Edison: <https://www.myon.com/reader/index.html?a=wb_wind_f11>

Rain (Weather Wise) by Helen Cox Cannons: <https://www.myon.com/reader/index.html?a=ww_rain_f14>

Wild Weather: Science Adventures with Sonny the Origami Bird (Origami Science Adventures) by Thomas Kingsley Troupe: <https://www.myon.com/reader/index.html?a=osa_wildw_s14>

Rumble, Boom! A Book About Thunderstorms by Rick Thomas: <https://www.myon.com/reader/index.html?a=as_thun_s05>

Electricity: Bulbs, Batteries, and Sparks by Darlene Stille: <https://www.myon.com/reader/index.html?a=as_elect_s04>

Hurricanes: Be Aware and Prepare (Weather Aware) by Renee Gray-Wilburn: <https://www.myon.com/reader/index.html?a=wa_hurric_f14>

Hurricanes (Little Scientist) by Martha E.H. Rustad: <https://www.myon.com/reader/index.html?a=sle_hurri_s14>

How to Build a Tornado in a Bottle by Lori Shores: <https://www.myon.com/reader/index.html?a=hof_torna_f10>

Tornadoes! By Marcie Aboff: <https://www.myon.com/reader/index.html?a=fgwe_torna_s12>

Tornadoes: Be Aware and Prepare by Martha Rustad: <https://www.myon.com/reader/index.html?a=wa_tornad_f14>

Floods: Be Aware and Prepare (Weather Aware) by Renee Gray-Wilburn: <https://www.myon.com/reader/index.html?a=wa_floods_f14>

Rising Waters: A Book About Floods (Amazing Science: Weather) by Rick Thomas: <https://www.myon.com/reader/index.html?a=as_floo_s05>

True or False? Weather by Daniel Nunn: <https://www.myon.com/reader/index.html?a=trfl_wther_s13>

True or False? Seasons by Daniel Nunn: <https://www.myon.com/reader/index.html?a=trfl_ssons_s13>

Clouds by Erin Edison: <https://www.myon.com/reader/index.html?a=wb_cloud_f11>

Exploring Spring by Terri DeGezelle: <https://www.myon.com/reader/index.html?a=es_esprin_s12>

Exploring Summer by Terri DeGezelle: <https://www.myon.com/reader/index.html?a=es_esumm_s12>

Leaves Fall Down: Learning about Autumn Leaves by Lisa Bullard: <https://www.myon.com/reader/index.html?a=aut_leave_f10>

Exploring Fall by Terri DeGezelle: <https://www.myon.com/reader/index.html?a=es_efall_s12>

What Do Animals Do in Fall? By Rebecca Felix (no myON)

Snow (Weather Wise) by Helen Cox Cannons: <https://www.myon.com/reader/index.html?a=ww_snow_f14>

Exploring Winter by Terri DeGezelle: <https://www.myon.com/reader/index.html?a=es_ewinte_s12>

All About Animals in Winter by Martha E.H. Rustad: <https://www.myon.com/reader/index.html?a=cw_anwin_f15>

Sunlight by Erin Edison: <https://www.myon.com/reader/index.html?a=wb_sunl_f11>

Days of the Week by Terri Dougherty: <https://www.myon.com/reader/index.html?a=rr_dweek_s06>

A Stormy Surprise by Jessica Gunderson: <https://www.myon.com/reader/index.html?a=kr_elect_s08>

Cloudy with a Chance of Meatballs by Judith Barrett (optional – no myON)

Should I Share my Ice Cream? by Mo Willems (optional - no myON)

Vocabulary

|  |  |
| --- | --- |
| **Word** | **Definition** |
| Absorb | To take in or soak up |
| Atmosphere | A thin layer of gases that surround the Earth |
| Breeze | A slight wind (usually refreshing) |
| Chlorophyll | The green coloring matter found in plants that absorbs energy from the sun to produce food for the plant |
| Cirrus Clouds | Thin, wispy clouds; usually high in the sky |
| Cloud | A large collection of very tiny droplets of water or ice crystals |
| Cumulonimbus Clouds | A dark, gray cloud, usually holding rain or another form of precipitation |
| Cumulus Clouds | Clouds that are piled up on top of each other; puffy, usually low-level |
| Dam | A barrier preventing the flow of water |
| Drizzle | To rain in very small drops |
| Downpour | A heavy rain |
| Drought | A long period of dry weather |
| Electricity | A form of energy found in nature but can be artificially produced |
| Emergency | An unexpected and usually dangerous situation that needs immediate action |
| Fall / Autumn | The season between summer and winter comprising in the Northern Hemisphere usually from September to November |
| Flood | A great flow of water that rises and spreads over the land |
| *Fog* | *Fine particles of water floating in the atmosphere near the ground* |
| Forecast | To calculate or predict, usually by study and examination of data |
| Gale | A strong wind |
| Gust | A sudden brief current of air |
| Humidity | The amount of water vapor in the air |
| Hurricane | A large rotating storm with high speed winds that form over warm water |
| Lightning | The flashing of light produced by a discharge of electricity from one cloud to another, or between a cloud and the earth |
| Mercury | The liquid in a thermometer that shows the air’s temperature |
| Meteorologist | A person who studies the science that deals with atmosphere and weather |
| Nimbus Clouds | Thunderstorm clouds that already have rain or snow falling from it |
| Pigment | The substance giving color to an object |
| Precipitation | Water that falls to the earth as hail, mist, rain, sleet, or snow |
| Pressure | The weight of the air above an area on the Earth’s surface |
| Rain | Water falling in drops from clouds |
| Rain Gauge | An instrument for measuring the quantity of precipitation |
| Reflect | To move in one direction, hit a surface, and then quickly move in a different direction |
| Season | Four different times during the year with different types of weather |
| Snow | Small, white, ice crystals formed directly from the water vapor of the air |
| Spring | The transition season from winter to summer, occurring from March through May in the Northern Hemisphere |
| Static Electricity | Electricity that consists of isolated, stationary charges |
| Stratus Clouds | Rain or snow clouds; looking like a huge grey blanket that hangs low in the sky |
| Summer | The seasons between spring and autumn: in the Northern Hemisphere, the months of June, July, and August |
| Sun | The star in the center of the solar system; life on Earth depends on light and heat from the sun |
| Supercell | A strong type of thunderstorm |
| Temperature | The degree of hotness or coldness of something |
| Thermometer | An instrument for measuring temperature |
| Thunder | The loud sound that follows a flash of lightning |
| Thunderstorm | A storm accompanied by lightning and thunder |
| Tornado | A rotating column of air extending from a thunderstorm to the ground |
| Water Vapor | Water in the form of a vapor or gas |
| Weather | The state of the atmosphere, or air, in any given place |
| Wind | The movement of air |
| Wind Vane | A device that measures the direction of the wind |
| Winter | The season between autumn and spring: December, January, and February in the northern half of the globe |

Lesson 1: What is weather?

|  |  |
| --- | --- |
| **Learning Target****Objective****Standard** | Weather is the day-to-day conditions of a particular place.Students will understand that weather is based on certain conditions in the atmosphere.K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, chart paper or white board, white board markers, science notebooks, pencils |
| **Books** | If It’s Really Cold….and Other Weather Predictions by Blake Hoena |
| **Vocabulary** | Weather: The daily state of the atmosphere, or air, in any given placePrecipitation: Water that falls to the earth as hail, mist, rain, sleet, or snowTemperature: The degree of hotness or coldness of something |
| **Procedures** | **ENGAGE**Ask the students: What is weather? What do we know about the weather? With the class, make a KWL chart to document everything they know, or think they know, about the weather. Ask the students to include what they want to know about the weather. Video: “What’s The Weather Like Today/Song Lyrics Video for Kids/The Kiboomers” (2:05): <https://www.youtube.com/watch?v=KUSbazn3STo>**EXPLORE**Ask the students: When the weather changes, what do we do? How do we act differently? Where do we go? How do we dress?Book: If It’s Really Cold….and Other Weather Predictions by Blake Hoena, or use myON link: <https://www.myon.com/reader/index.html?a=ib_cold_f12>Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to find a partner for discussion. Using their white boards and the book, have students use white boards draw or write down what they would wear in each weather example. Go over any misconceptions while they are responding. Ask the students: Why do you think it is important to understand the weather? Why would you need to know the temperature and precipitation every day?**EXPLAIN**Video: “Sesame Street – Weather” (6:19): <https://www.youtube.com/watch?v=d18lzD2GCks>Different regions around the country have different types of weather. For example, in the southwest, it is far less common for snow to fall than it would be in the northwest. Students may need to have the different types of weather explained in greater detail, as well as why certain types are only in different areas of the country. Explain to students that they need to understand weather for several reasons: to dress appropriately, to adjust their shelter as necessary, and to predict more severe forms of weather.Video: “Classic Sesame Street – Grover tries to sell Kermit a Weather Machine” (2:46): <https://www.youtube.com/watch?v=rV8GGMXBgKE> |
| **Enrichment** | **EXTEND**Send home the Reading A to Z book: How is the Weather Today? or another easy reader. Instruct the students and families to do the following: I Do/We Do/You Do:* I Do: The parent reads the book to the child
* We Do: The parent and child read the book together
* You Do: The child reads the book on their own

The reader may need to be read multiple times before the student is ready to read on their own but will reinforce the concept of dressing for the weather. |
| **Closure** | **ELABORATE**The weather is the state of the atmosphere at any time, including temperature, precipitation, cloud cover, and air pressure. Daily changes in the weather are due to winds and storms. By studying the weather, people can be ready for the weather that may happen the next day, or for how the weather will typically be during a certain season. |
| **Assessment** | **EVALUATE**Formative: Check the white boards for understanding regarding checking and dressing for different types of weather.  |

Differentiated Instruction

|  |  |  |
| --- | --- | --- |
| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the idea of weather, and how there are many different types that require different responses. Review the KWL chart and answer any clarification questions the student may have.  | Discuss the idea of weather, and how there are many different types that require different responses. Ask the student: How does knowing what the weather is going to be help at home?  | Discuss the idea of weather, and how there are many different types that require different responses. Ask the student: Is the weather likely to be the same tomorrow as it was today? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student act out or draw the different ideas brainstormed in the KWL chart.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather. Repeat the motions with them until they can tell you what they are.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: Can you explain how the weather affected what you wore today? Do you think your family checks the weather before you come to school? Why or why not? |
| **Interactive Technology** |
| App: “School Bell Weather – Weather for Kids” – Ladeez First MediaApp: “MarcoPolo Weather” – The Weather Learning GameGame: The Cat in the Hat Knows a Lot About That: “Weather Transformer”: <http://pbskids.org/catinthehat/games/weather-transformer>Game: Sid the Science Kid: “Weather Wheel”: <http://pbskids.org/sid/weatherwheel.html>Game: Everyday Science for Preschoolers: “Dress for the Season”: <https://vegas.pbslearningmedia.org/resource/evscps.sci.ess.watcyc.dress/dress-for-the-weather/#.Wpbz26inGUk>Game: EduPlace/ Houghton Mifflin Company: “Discover! Looking at the Sky”: <http://www.eduplace.com/kids/hmsc/activities/simulations/grk/unitd.html> |

Lesson 2: How is the weather described?

|  |  |
| --- | --- |
| **Learning Target****Objective****Standard** | The type of weather on any given day is based on temperature, precipitation, and wind.Students will be able to use different terms to describe the weather K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks |
| **Books** | Forecasting Weather by Terri Sievert |
| **Vocabulary** | Meteorologist: A person who studies the science that deals with atmosphere and weather.Atmosphere: A thin layer of gases that surround the EarthPrecipitation: Water that falls to the earth as hail, mist, rain, sleet, or snowForecast: To calculate or predict, usually by study and examination of data |
| **Procedures** | **ENGAGE**Ask the students: How do we describe the weather? Do we use just one way to describe it? Have the students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to find a partner for discussion. Tell the students they are all going to be meteorologists. Ask the students: What do you think a meteorologist does?Video: “Check out the weather! (a weather song for kids)” (2:42): <https://www.youtube.com/watch?v=RmSKsyJ15yg>**EXPLORE**With their partners, give students an opportunity to look outside: either through a window or by taking the students outside with their whiteboards. Give the students a few minutes to write down a few words or draw a picture of the weather.Ask the students: Is there a way to add on to your description of the weather? What can you use? Give students the opportunity to Pairs Compare (<https://www.kaganonline.com/>) with other pairs to see the descriptions they wrote down for the weather outside. As a meteorologist, the more descriptions they can give – the more accurate their forecast.**EXPLAIN**Video: “Kid Meteorologist” (1:28): <https://www.youtube.com/watch?v=PvZv3D8SKUA&t=10s>A meteorologist is a person who studies the science that deals with atmosphere and weather. The job of a meteorologist is very important. Meteorologists use different tools to describe the weather that is happening currently, as well as predict the way the weather will be later in the day, and even later in the week.Discuss the ways that the weather can be described. Instead of just saying “sunny” or “rainy,” use other ways to describe the weather, including temperature (hot, warm, cold,) precipitation (wet, dry,) and wind (calm, light wind, heavy wind.) Explain that the more ways we can describe the weather, the more accurate a forecast can be. Using the Weather Channel website, look at the daily forecast. What do you notice about the weather report compared to what we wrote down? What can we add to make our observations look more like the weather channel? Take note of points such as wind, humidity, pressure, and temperature.Weather Channel: <https://weather.com/>Book: Forecasting Weather by Terri Sievert, or use myON link: <https://www.myon.com/reader/index.html?a=ess_fweat_f11> |
| **Enrichment** | **EXTEND**Using the MeteoEarth website, look at the current temperature, precipitation, cloud cover, wind, and pressure maps that meteorologists might use to predict the weather: <http://www.meteoearth.com/> |
| **Closure** | **ELABORATE**Discuss the fact that knowing and being able to predict what types of weather, especially extreme weather, is helpful in keeping people safe. By knowing and understanding weather, temperature, and the wind; it is possible to predict more severe types of weather.  |
| **Assessment** | **EVALUATE**Formative: Ask students to describe the weather in three different ways. Examples may be hot, sunny, and cloudy.  |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss different terms that can be used to describe different types of weather. Review the term “meteorologist.” | Discuss different terms that can be used to describe different types of weather. Ask the student: What other ways can the weather be predicted?  | Discuss different terms that can be used to describe different types of weather. Ask the student: Is a meteorologist always right? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student act out or draw the different ways to describe the weather.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different ways to describe the weather. Repeat the motions with them until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What would happen if you only knew it was raining outside? How would it change what you wore for the day? Why is it helpful to have more information about the weather? (An example might be cold and raining verses warm and raining.) |
| **Interactive Technology** |
| App: “Freddy the Frogcaster’s Weather Station” – Nine 22 Media, LLCApp: “Weather Duck” – Hendri SoeriantoApp: “Weather Puzzles for Toddlers and Preschool” – Scott Adelman Apps Inc |

Lesson 3: How is weather measured? (Thermometer)

|  |  |
| --- | --- |
| **Learning Target****Objective****Standard** | Weather is the day-to-day conditions of a place and is measured by different tools.Students will understand that several tools are used to measure the weather.K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, BrainPOP jr. login, individual white boards, white board markers, science notebooks, thermometer, class/group set of: glass bottles, rubbing alcohol, water, plastic measuring cups, funnels, food coloring, modeling clay, clear straws, ice |
| **Books** | Temperature Heating Up and Cooling Down by Darlene StilleThe Pool Party by Marcie Aboff |
| **Vocabulary** | Thermometer: An instrument for measuring temperatureMercury: The liquid in a thermometer that shows the air’s temperature Temperature: The degree of hotness or coldness that can be measured using a thermometer |
| **Procedures** | **ENGAGE**Ask the students: When you are trying to find out the weather, what kinds of tools do you use? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to find a partner for discussion to discuss the different tools they may use for the weather. Students may discuss different types of weather, such as warm or cold. Ask the students: How do you know how warm or cold it is? Book: Temperature Heating Up and Cooling Down by Darlene Stille, or use myON link: <https://www.myon.com/reader/index.html?a=as_tempe_s04>**EXPLORE**Video: “The Thermometer Song (song for kids about temperature)” (1:58): <https://www.youtube.com/watch?v=Vk6rP_4wpvk>Video: BrainPOP jr.: “Temperature” (4:46): <https://jr.brainpop.com/math/measurement/temperature/>Tell the students: A thermometer measures how hot or cold something is. Ask: How do you think a thermometer is made? Give students a few minutes to discuss before giving them the supplies and instructions.PBS Parents - DIY Bottle Thermometer: <http://www.pbs.org/parents/adventures-in-learning/2014/09/diy-bottle-thermometer/>Have the class Mix-Freeze-Group (<https://www.kaganonline.com/>) to create groups of 4-6 depending on the class size. Each group will need: an empty glass bottle, a funnel, food coloring, modeling clay, a clear straw, ice, ½ cup of rubbing alcohol, and ½ cup of water.Using the funnel, students should pour the water into the glass bottle. Pour the rubbing alcohol into the bottle. Add a few drops of food coloring. Mix by swirling the bottle around gently. Insert the straw into the bottle. Make sure it doesn’t fall or touch the bottom. Secure the straw with the modeling clay at the top of the bottle, making sure not to cover the top of the straw. Place the thermometer in the sun to see it in action, then place it on top of the ice cubes to see it cool back down.Ask students to draw pictures of the thermometer as they test it: both when the temperature is warm, and when it is cold. Ask the students: What is the difference in the two pictures?**EXPLAIN**The temperature of something is a measure of hot or cold it is, usually measured with a thermometer. Discuss how a thermometer works: when the thermometer is measuring something warm or hot, the red liquid (mercury) in the thermometer goes up. When the thermometer is measuring something cool or cold, the red liquid in the thermometer goes down. In the experiment, as the temperature of the liquid in the bottle increases, it expands – or spreads out. The only place the liquid can go up is through the straw. If the temperature of the liquid decreases, it contracts or shrinks, the liquid expands when it gets warm, and moves up the straw. The liquid contracts when it gets cold and moves back down the straw. Give the class a chance to explore the regular thermometer. With a Venn diagram, compare the two different versions of the thermometers. Ask the students: Which thermometer would you want to use if you were a meteorologist? Why? |
| **Enrichment** | **EXTEND**Ask the students: When is it important to know the exact temperature outside? Is it only important for meteorologists? When would you use it at your home?Book: The Pool Party by Marcie Aboff, or use the myON link: <https://www.myon.com/reader/index.html?a=kr_pool_s08> |
| **Closure** | **ELABORATE**Discuss how a thermometer would help a meteorologist do their job. To make predictions accurately for the future, the meteorologist needs to know the exact temperature rather than if it is just hot or cold.  |
| **Assessment** | **EVALUATE**Formative: Ask the student to describe the purpose of a thermometer. Check for understanding during observation of the experiment. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the idea of weather, and how a thermometer is used to measure temperature. Review the importance of knowing temperature. | Discuss the idea of weather, and how a thermometer is used to measure temperature. Ask the student: How does knowing what the weather is going to be help at home?  | Discuss the idea of weather, and how a thermometer is used to measure temperature. Ask the student: Is the temperature likely to be similar tomorrow? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student act out or draw the difference in a thermometer between measuring hot or cold temperatures.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different ways a thermometer works. Repeat the motions with them until they can tell you what they are.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about the thermometer you made verses the one bought from the store? Do you think they both work the same way?  |
| **Interactive Technology** |
| App: “Digital Thermometer app” – Current temperature&humidityGame: PBS Kids: Sid the Science Kid: “Weather Surprise” <http://pbskids.org/sid/fablab_weathersurprise.html>Website: Math is Fun: “The Interactive Thermometer” <https://www.mathsisfun.com/measure/thermometer.html> |

Lesson 4: How is weather measured? (Wind vane)

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| **Learning Target****Objective****Standard** | Weather is the day-to-day conditions of a place and is measured by different tools.Students will understand that several tools are used to measure the weather.K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, individual white boards, white board markers, science notebooks, yogurt container with lid, sand, sharpened pencils, drinking straws, straight pins, poster board, Sharpie, compass, modeling clay, paper plates, rulers, fan, pinwheel |
| **Books** | Wind by Gail Saunders-Smith |
| **Vocabulary** | Wind: The movement of airWind Vane: A device that measures the direction of the windGust: A sudden brief current of airBreeze: A slight wind (usually refreshing)Gale: A strong wind |
| **Procedures** | **ENGAGE**Ask the students: When you are trying to find out the weather, what kinds of tools do you use? Review the different types of weather instruments brainstormed in the previous lesson. Ask the students questions such as: What is a wind vane? How do you think it works? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to find a partner to discuss the wind, and what a wind vane might be used for.Video: “Sesame Street Windy with Alison Bartlett O’Reilly Video” (5:29): <https://www.youtube.com/watch?v=36XwSbM8stQ>**EXPLORE**Book: Wind by Gail Saunders-Smith, or use myON link: <https://www.myon.com/reader/index.html?a=wb_wind_f11>Video: “Wind direction and speed” (2:09): <https://www.youtube.com/watch?v=SqbTrbxWT1o>Ask the students: What do you think a wind vane is? How do you think it is made? Give students a few minutes to discuss before giving them the supplies and instructions.Education.com: How to Make a Wind Vane: <https://www.education.com/activity/article/wind_vane_first/>Have the class StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) with their previous partner. Give each pair a yogurt container with a lid, a handful of sand, a sharpened pencil, a drinking straw, an arrow, a tail, a paper plate, a ruler, tape, and a black marker.Have the students put the lid on the yogurt cup and turn the cup upside down onto a paper plate. Trace around the lid of the yogurt cup. Using the ruler, divide the paper plate into four sections. Moving from the top, clockwise, write, “North, East, South, West.” The paper plate will serve as the base. Open the yogurt container and put a blob of modeling clay on the bottom and fill the remainder with sand. Snap the lid closed and tape it to keep it secure.Glue the container, upside down, onto the base. Take the sharpened pencil and poke it through the center of the plastic container so the eraser is on top, and the point is held by the putty and sand. Put the arrow head and tail on each end of the straw. Use a bit of glue to secure them if they seem to slip. With assistance, push the pin through the center of the straw, and attach it to the top of the pencil, then attach it to the top of the pencil eraser. If the students flick the straw or blow on either end, it should move freely. Take the students outside to a place where the wind is not highly obstructive. Using a compass, have the students line up the wind vanes accordingly. Wait for the next breeze: the arrow will point to where it’s coming from. If it is not windy outside, the same experiment can be completed using a fan inside the classroom with the same procedures.Have students draw a picture of the wind vane in their science notebook. Ask: What happened when the wind blew on the wind vane? How do you think it would help to know which direction the wind is blowing?**EXPLAIN**Wind direction is described by using the direction what the wind came from. Different tools are used to measure wind direction, such as an anemometer to measure the wind speed; a wind sock, which is designed to measure wind direction and relative wind speed; and a wind vane, which measure the direction which the wind is blowing. A wind vane is also called a weather vane and was probably one of the first weather instruments ever used. A weather vane points in the direction opposite to the direction of the wind. For example, if the wind is coming from the west, the arrow will point to the west. If the weather vane changes from west to east, this may be a signal that a mass of lower pressure is above and will bring storms. If the weather vane shifts from the south, this may indicate warmer air is on the way. If the vane is swinging erratically, it means the air is unstable and the current weather conditions are changing. It is important for scientists to know wind direction to predict weather patterns and severe weather.Video: “Winds In The East Mary Poppins 1964” (0:25): <https://www.youtube.com/watch?v=SSfGBskfthg> |
| **Enrichment** | **EXTEND**Ask the students: Why would it be important to know the direction of the wind? What would it tell a meteorologist about the weather around them? What else might a meteorologist want to know about the wind? How could the wind be used?Optional: Show the students a pinwheel and how it works when the wind hits it. Ask the students: Could this be used as a wind vane? What about something else? Why or why not?Book: Today Is a Windy Day by Martha Rustad, or use myON link: <https://www.myon.com/reader/index.html?a=wwt_wind_s17> |
| **Closure** | **ELABORATE**Knowing the direction of the wind, as well as the temperature, are two ways meteorologists can predict the weather in the future. The more data the meteorologist has – the more accurately they can determine the weather in the future and predict more severe weather as well.Video: “How Does A Weathervane Work” (1:15): <https://www.youtube.com/watch?v=CvG2vwrNsdE> |
| **Assessment** | **EVALUATE**Formative: Ask the student to describe the purpose of a wind vane. Check for understanding during observation of the experiment. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the idea of weather, and how a wind vane is used and why. Review the importance of knowing the direction of the wind. | Discuss the idea of weather, and how a wind vane is used and why. Ask the student: How does knowing what the weather is going to be help at home?  | Discuss the idea of weather, and how a wind vane is used and why. Ask the student: Is the wind likely to be similar tomorrow? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student act out or draw how a wind vane works.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different ways a wind vane works. Repeat the motions with them until they can tell you what they are.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: How would you apply what you learned to develop a machine to capture the wind? What materials would work? Which ones wouldn't work?    Why or why not? |
| **Interactive Technology** |
| App: “Wind Compass” – Anapa AppsGame: BBC Home: “Wind Direction:” <http://www.bbc.co.uk/schools/whatisweather/aboutweather/winddir.shtml>Game: BBC Home: “Wind Force:” <http://www.bbc.co.uk/schools/whatisweather/aboutweather/windforce.shtml> |

Lesson 5: How is weather measured? (Rain gauge)

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| **Learning Target****Objective****Standard** | Weather is the day-to-day conditions of a place and is measured by different tools.Students will understand that several tools are used to measure the weather.K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, individual white boards, white board markers, science notebooks, rain gauge, clear 2-liter bottles, pebbles, tape, marker, ruler, spray bottle |
| **Books** | Rain (Weather Wise) by Helen Cox Cannons |
| **Vocabulary** | Rain: Water falling in drops from cloudsRain gauge: An instrument for measuring the quantity of precipitationPrecipitation: Water that falls to the earth as hail, mist, rain, sleet, or snowDrizzle: To rain in very small dropsDownpour: A heavy rainDrought: A long period of dry weather |
| **Procedures** | **ENGAGE**Ask the students: When you are trying to find out the weather, what kinds of tools do you use? Review the different types of weather instruments brainstormed in the previous lessons. Ask the students about a rain gauge, such as: What is a rain gauge? How do you think it works? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to find a partner to discuss the rain, and what a rain gauge might be used for.Video: “Sesame Street animation – the cat who hated rain” (1:31): <https://www.youtube.com/watch?v=Y3TMYXzXrDQ>**EXPLORE**Book: Rain (Weather Wise) by Helen Cox Cannons, or use myON link: <https://www.myon.com/reader/index.html?a=ww_rain_f14>Video: “Classic Sesame Street – Ernie over-prepares for rain” (3:04): <https://www.youtube.com/watch?v=tZhKem-fG3k>Ask the students: How do you think a rain gauge is made? Give students a few minutes to discuss before giving them the supplies and instructions.Science Kids: Rain Gauge Project: <http://www.sciencekids.co.nz/projects/raingauge.html>Teacher’s note: Before the experiment, cut the 2-liter bottles about a quarter of the way down. Keep both pieces. Have the class StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) with their previous partner. Give each group a cut, clear 2-liter bottle; some pebbles, tape, a marker, a ruler, and a spray bottle.Place some stones in the bottom of the cut bottle up to the point where the entire is bottle is level (in the grooves on the bottom.) This will help the gauge to stay still. Pour some water into the bottle until it is just above where the stones are. Use a marker to draw a line where the water line stops. Turn the top of the bottle upside down and place it inside the base to create a funnel.Use the ruler to make marks on the side of the bottle starting at where the water line stops. Mark every 1/4” up the side of the bottle until it reaches the top. Put the rain gauge outside where it can collect water when it starts raining. Ideally, after a rain shower has finished, check to see how far up the scale the water has risen. Chances are, there will not be a rainstorm before the end of the experiment. Instead, have the students use a spray bottle to simulate rain. The spray bottle can also be used to demonstrate the different types of rain. Have students draw a picture of the rain gauge in their science notebook. Ask: What happened when the water fell into the rain gauge? How do you think it would help to know how much rain is falling in a certain area?**EXPLAIN**Video: “Learn How to Measure Rainfall” (4:43): <https://www.youtube.com/watch?v=WyMabcRzUcw>There are many different types of rain gauges. A standard rain gauge has a cylinder with measurement marks on the side and a funnel on top. When the rain falls, it goes into the funnel and collects in the cylinder. Many rain gauges have two cylinders: a small cylinder inside of a larger cylinder. This way, if the small cylinder fills up, the extra rain will collect in the large cylinder and provide an accurate measurement of the total rainfall.An optical rain gauge uses light beams to determine how much rain has fallen and how quickly. As the rain hits the light beam, the machine can determine how much rain is falling through the beam and how quickly it is falling. A tipping bucket rain gauge has a funnel with a seesaw-like spout. As the rain drop goes down the funnel, it falls on one side of the seesaw and into the container. The next rain drop then falls on the other side of the seesaw. By counting the number of times the seesaw moves back and forth, a person or machine can determine the amount of rain and how fast it is falling.Rain gauges are used to measure the amount of rain over a certain period. Rainfall has been measured for hundreds of years to determine crop growth. By measuring rainfall, scientists can determine if an area is in danger of being flooded, is getting enough rain, or if it is in danger of a drought.  |
| **Enrichment** | **EXTEND**Ask the students: Why would it be important to know how much rain is in a certain area? What would it tell a meteorologist about the weather around them? What else might a meteorologist want to know about the rain? Could the rain be used for anything useful? |
| **Closure** | **ELABORATE**Meteorologists use information gathered from rain gauges to report on how much rain a specific area has received, both for a single event and accumulation over time. Comparing current data to previous years helps scientists to know if an area is receiving too much or too little rainfall. Rainfall affects plant life, food, and water supplies; as well as information for farmers and gardeners for planting and harvesting purposes.  |
| **Assessment** | **EVALUATE**Formative: Ask the student to describe the purpose of a rain gauge. Check for understanding during observation of the experiment. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the idea of weather, and how a rain gauge is used and why. Review the importance of knowing how much rain falls in a certain area. | Discuss the idea of weather, and how a rain gauge is used and why. Ask the student: How can a rain gauge help at home?  | Discuss the idea of weather, and how a rain gauge is used and why. Ask the student: When would it be important to know how much water is flowing over a certain area? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student act out or draw how a rain gauge works.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore how a rain gauge works. Repeat the motions with them until they can tell you how it works.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: How would you apply what you learned about three of the different types of weather instruments to help forecast the weather? What if you only had two of them? |
| **Interactive Technology** |
| App: “Rain Sleep Sounds” – Relax & Sleep BetterApp: “Rain Sound Central” – Mike NapoliGame: Happy Clicks: Collecting Raindrops!: <http://www.happyclicks.net/free_online_games_toddlers/toddlers_game_raindrops.php> |

Lesson 6: Why does the weather need to be forecasted?

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| **Learning Target****Objective****Standards** | Weather forecasting helps to prepare for severe weather. Students will understand the importance of weather forecasting daily, especially as it relates to severe weather.K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.SL.K.5: Add drawings or other visual displays to descriptions as desired to provide additional detail. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, chart paper |
| **Books** | Forecasting Weather by Terri SievertWild Weather: Science Adventures with Sonny the Origami Bird (Origami Science Adventures) by Thomas Kingsley Troupe |
| **Vocabulary** | Meteorologist: A person who studies the science that deals with atmosphere and weather.Forecast: To calculate or predict, usually by study and examination of dataAtmosphere: A thin layer of gases that surround the Earth |
| **Procedures** | **ENGAGE**Ask the students: What is a meteorologist? Do you remember what a meteorologist does? Using the different weather instruments, we made, how would you be a meteorologist for the class? What would be the most important part of being a meteorologist? Have students Mix-Pair-Share (<https://www.kaganonline.com/>) with a partner to discuss their ideas and thoughts about being a meteorologist.Video: “Weather Song Video” (3:35): <https://www.youtube.com/watch?v=e5UTaPV-DIg>**EXPLORE**Video: “Severe Weather: Crash Course Kids #28.2” (4:25): <https://www.youtube.com/watch?v=QVZExLO0MWA>Book: Forecasting Weather by Terri Sievert, or use myON link: <https://www.myon.com/reader/index.html?a=ess_fweat_f11>As a class, look at the different tools used by a meteorologist. Ask: How do you think each tool is used by a meteorologist? Do you think a meteorologist only uses one tool? Why? Video: “Weather 101 for kids – with Meteorologist JD Rudd” (5:33): <https://www.youtube.com/watch?v=qWWx3reC9qA>Have the class Mix-Freeze-Group (<https://www.kaganonline.com/>) to create groups of 2-6 (depending on the class size) to create a weather forecast. Students can use any of the tools previously created to make their forecast. Take the students outside with their whiteboards. Students can bring and use any of the tools previously created weather tools to make their forecast. Give students about 10-15 minutes to look at the weather outside and use their tools. Encourage students to look at all aspects of the weather: is it sunny? Is it partly cloudy? Windy? Is it more than one thing?Once the students are finished with their observations, they can return inside and draw a picture of the weather on chart paper of their forecast. Make sure the students use labels based on their observations. Students should make at least three observations of the weather outside before presenting it to the class. Give students some time to work on their weather reports before presenting it in front of the class. **EXPLAIN**Weather forecasting is a prediction of what weather will be like in an hour, tomorrow, or next week. Weather forecasting involves a combination of computer models, observations, and a knowledge of trends and patterns. By using these methods, reasonably accurate forecasts can be made up to seven days in advance. However, a weather forecast is still an educated guess – meteorologists cannot control the weather. The best they can do is observe past and present patterns and data and apply this information to what they think will happen in the future.One of the most important reasons for weather forecasting is to predict severe weather. Discuss the types of severe weather that is seen in the area where the students live. (Example: in southern Nevada, it could be high winds, extreme heat, flash floods, and/or thunderstorms.) Explain that, as previously discussed, these can be dangerous, but with notice, there are ways to avoid them.Video: “Severe Weather: FEMA” (7:22): <https://www.youtube.com/watch?v=kXw1feTnkU4&t=377s> |
| **Enrichment** | **EXTEND**Take another look at the interactive map and see what meteorologists see when they study temperature, precipitation, and so on: <http://www.meteoearth.com> Ask the students: How is this map different than your observations made outside?Video: “How a Weather Forecast is Made” (2:47): <https://www.youtube.com/watch?v=I_mvYJlypfo&t=4s> |
| **Closure** | **EXPLAIN**Meteorologists use science and different science instruments to observe, explain, and forecast the weather. By understanding the weather, they can predict when severe weather may happen, which will keep people safe.Book: Wild Weather: Science Adventures with Sonny the Origami Bird (Origami Science Adventures) by Thomas Kingsley Troupe, or use myON link: <https://www.myon.com/reader/index.html?a=osa_wildw_s14> |
| **Assessment** | **EVALUATE**Formative: Check for at least 3 different aspects of the weather while students are giving their weather report. Ask students which instruments they used to come up with the data on their weather reports for the class. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the idea of a meteorologist and the ways they can forecast the weather. Review the definition of forecasting. | Discuss the idea of a meteorologist and the ways they can forecast the weather. Ask the student: Why would it be important to be able to forecast the weather? | Discuss the idea of a meteorologist and the ways they can forecast the weather. Ask the student: Has it gotten easier or more difficult to forecast the weather as more time has passed? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures of the weather and how it is forecasted.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather and forecasting, including reviewing the definition of a meteorologist and forecasting the weather. Repeat showing different types of weather until students can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 3)** |
| Ask students: What is the difference between forecasting and guessing what the weather will be? How would you test what the weather will be like tomorrow? |
| **Interactive Technology** |
| App: “Weather Alert Map USA” – Severe Weather & Storm Tracks |

Lesson 7: Why does the weather need to be forecasted? (Thunderstorms)

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| **Learning Target****Objective****Standards** | Weather forecasting helps to prepare for severe weather. Students will understand the importance of weather forecasting daily, especially as it relates to severe weather.K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, chart paper, shaving cream, clear jars, water, container of water dyed blue, pipettes, Sharpie, scissors, Styrofoam, masking tape, aluminum pie tin  |
| **Books** | Rumble, Boom! A Book About Thunderstorms by Rick ThomasElectricity: Bulbs, Batteries, and Sparks by Darlene Stille |
| **Vocabulary** | Thunderstorm: A storm accompanied by lightning and thunderLightning: The flashing of light produced by a discharge of electricity from one cloud to another, or between a cloud and the earthThunder: The loud sound that follows a flash of lightningElectricity: A form of energy found in nature but can be artificially producedStatic electricity: Electricity that consists of isolated, stationary charges |
| **Procedures** | **ENGAGE**Ask the students: What is a thunderstorm? Have you ever been in a thunderstorm? What do you remember about it? Have students Mix-Pair-Share (<https://www.kaganonline.com/>) with a partner who has been in a thunderstorm to discuss different parts of it, including thunder and lightning, and what they noticed about it.Video: “What Causes Thunder and Lightning?” (3:37): <https://www.youtube.com/watch?v=fEiVi9TB_RQ>**EXPLORE**Tell the students: What does it look like when it rains? Are the clouds light, or are they dark? What about in a thunderstorm? How is it different than the rain?Video: “Thunder and Lightning Explained for Kids!” (10:00): <https://www.youtube.com/watch?v=mCJPQ9dCUfs&t=3s>Make a rain cloud in a jar: <https://www.giftofcuriosity.com/make-a-rain-cloud-in-a-jar/>Have the class Mix-Freeze-Group (<https://www.kaganonline.com/>) to create groups of 2-6 (depending on the class size) to create a rain cloud. Give each group a clear jar, a container of shaving cream, some clear water, a container of water dyed blue, and a pipette.Have each group fill the jar nearly to the top with plain (non-dyed) water. Fill the jar until there is about 2” of space between the top of the water and the top of the jar. If you feel the students may have a hard time gauging the difference, mark the jar with a sharpie on the side as a “fill line.” Squirt the shaving cream on top of the water to make the “cloud.” Allow the shaving cream to fill up over the top of the jar for a fluffy, cloud-like look. Give the students a chance to predict what will happen when they add blue water onto the top of the “cloud.” Will the water stay on the cloud? Will it fall off the side? Students should write or draw pictures in their science notebooks.Using the pipette, drip blue water onto the rain cloud. Let the students know the drops are like droplets being added to a cloud but are not quite big and heavy enough to fall to the ground as rain. Keep adding water slowly to the cloud until it is saturated enough to start “raining.” The students should see blue streaks of water going into the jar. Have students draw a picture of the result in their science notebooks, complete with labels. Were they right?**EXPLAIN**Book: Tumble, Boom! A Book About Thunderstorms by Rick Thomas, or use myON link: <https://www.myon.com/reader/index.html?a=as_thun_s05>As part of the water cycle, water in oceans, lakes, and rivers turns into water vapor when heated by the sun. The evaporated water rises into the air. As it goes higher, it encounters cooler temperatures, which causes the water vapor to condense. When enough of these liquid water droplets come together, they form a cloud. As the water droplets collide and bump into each other, they form bigger water droplets, eventually falling to the ground as precipitation. Lighting is a current. As a thundercloud is forming, if it is cold enough, the raindrops freeze and bump into each other as they move around in the air, creating an electrical charge. After a while, the cloud fills up with electrical charges. The positive charges form at the top of a cloud, and the negative charges form at the bottom of the cloud. The charges eventually connect with a charge that reaches down from the clouds, making lightning strike. Thunder is caused by the sound heard from lightning.Thunderstorms are severe in that they can bring strong winds, hail, and tornadoes. Forecasting them ahead of time gives people a chance to be safe. Using a circle map, brainstorm the different ways people can stay safe in case of a thunderstorm. Ideas may include staying inside, removing dead trees that could fall, securing outdoor objects, unplug electronic equipment, and securing outside doors. Hang on to the circle map until the research project at the end of the unit. |
| **Enrichment** | **EXTEND**Lightning is very similar to static electricity. This experiment can be shown or can be done in the different groups. You will need scissors, Styrofoam, masking tape, and an aluminum pie tin. Super Sparker: <https://www.exploratorium.edu/science_explorer/sparker.html>Cut a 90-degree angle shaped small piece of Styrofoam, leaving most of it intact. Using the masking tape, attach the piece of Styrofoam to the center of the pie tin to create a handle. Rub the rest of the Styrofoam on your hair fast. Put the Styrofoam upside down on a table. Use the handle to pick up the pie tin. Hold it about a foot over the Styrofoam and drop it. Very slowly, touch the tip of your finger to the pie tin. You should get a spark. Use the handle to pick up the pie tin again and touch the tin again with your finger. You should get another spark. This should happen repeatedly. If it stops happening, rub the Styrofoam on your head again, and start over.  |
| **Closure** | **EXPLAIN**When the Styrofoam is rubbed on your hair, you pull electrons off your hair and pile them up on the Styrofoam. When the pie tin is put on the Styrofoam, the electrons on the Styrofoam pull on the electrons in the tin. When you lift the pie tin away from the plate, the tin attracts all nearby electrons. The lightning bolt is a dramatic example of static electricity in action.Book: Electricity: Bulbs, Batteries, and Sparks by Darlene Stille, or use myON link: <https://www.myon.com/reader/index.html?a=as_elect_s04> |
| **Assessment** | **EVALUATE**Formative: Check the experiments and journal entries for understanding, including discussing what lightning is like (static electricity.)  |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss thunderstorms and lightning, as well as reviewing why they are a form of severe weather. Review how knowing the weather ahead of time can give people a chance to be safe. | Discuss thunderstorms and lightning, as well as reviewing why they are a form of severe weather. Ask the student: What other forms of severe weather can come from thunderstorms?  | Discuss thunderstorms and lightning, as well as reviewing why they are a form of severe weather. Ask the student: What is the most dangerous thing about a thunderstorm? Why? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures of a thunderstorm, including lightning.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather and forecasting, including reviewing the definition of a thunderstorm and lightning. Repeat showing the different pictures and objects until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about thunderstorms? Are they the worst form of severe weather? Why or why not? |
| **Interactive Technology** |
| App: “Thunderstorm Sounds Nature – Thunderstorm” – Javed Khan PathanApp: “My Lightning Tracker & Alerts” – Live Lightning Map & TrackerApp: “Volt – 3D Lightning” – Unleashed From Your Fingertips |

Lesson 8: Why does the weather need to be forecasted? (Hurricanes)

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| **Learning Target****Objective****Standards** | Weather forecasting helps to prepare for severe weather. Students will understand the importance of weather forecasting daily, especially as it relates to severe weather.K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, clear bowls, food coloring, warm water, stir sticks, shaving cream |
| **Books** | Hurricanes: Be Aware and Prepare (Weather Aware) by Renee Gray-WilburnHurricanes (Smithsonian Little Explorer) by Martha Rustad |
| **Vocabulary** | Hurricane: A large rotating storm with high speed winds that form over warm waterPressure: The weight of the air above an area on the Earth’s surfaceTemperature: The degree of hotness or coldness that can be measured using a thermometer Humidity: The amount of water vapor in the air |
| **Procedures** | **ENGAGE**Ask the students: What is a hurricane? Have you ever been in a hurricane, or remember seeing one on TV? What do you remember about it? Have students Mix-Pair-Share (<https://www.kaganonline.com/>) with a partner to discuss what they think a hurricane might be, and what they noticed about it.Video: “What’s a Hurricane?” (4:09): <https://www.youtube.com/watch?v=xKubdY2mHXc>**EXPLORE**Video: “Hurricane Facts for Kids!” (11:51): <https://www.youtube.com/watch?v=2kLwbb0ggFU>Make a Hurricane in a Bowl: <http://experimentexchange.com/earth-space/make-a-hurricane-in-a-bowl/>Have the class Mix-Freeze-Group (<https://www.kaganonline.com/>) to create groups of 2-6 (depending on the class size) to create a hurricane in a bowl. Give each group a large clear bowl, warm water, a long stir stick, and blue food coloring.Tell the students they will be replicating a hurricane and the way it moves. Ask the students: How do you think a hurricane moves? Google “satellite picture of a hurricane” and show it to the class. Ask students: What do you notice? Have the students draw a picture of a hurricane in their science notebooks.Students should pour water into a bowl about ¾ of the way full. With the stirrer, stir the water in a circle until it is spinning. The warm water represents what a hurricane needs to have to get started. Place a drop of food coloring near the center of the bowl as the water begins to spin. Have students observe how the bands radiate out as it spins and begin to lose their shape as the spinning slows down and loses its energy. Students should draw a picture of what they see. What does it look like in comparison to the picture? Have students add a layer of shaving cream to the top of the bowl and stir it again until it makes the same swirling motion as before. Does it look even more like the picture now? Why or why not? **EXPLAIN**Book: Hurricanes: Be Aware and Prepare (Weather Aware) by Renee Gray-Wilburn, or use the myON link: <https://www.myon.com/reader/index.html?a=wa_hurric_f14>A hurricane is a large, rotating storm with high speed winds that forms over warm waters. When the warm air rises, it is replaced by cooler air, which will warm and start to rise. This causes storm clouds to form, which will rotate with the spin of the Earth. If there is enough warm water, the cycle will continue: the wind speeds and storm clouds will grow, causing a hurricane to form. Meteorologists predict when and where a hurricane will strike. They look for air pressure falling, wind speed, and humidity. Using these instruments, along with radar and satellite, they can predict where and when a hurricane will hit. A hurricane watch goes out 36-48 hours before a hurricane hit. As the storm gets closer, the forecasting becomes more accurate. Hurricane warnings go out a day in advance, so evacuation can take place.Hurricanes are severe in that they have high winds, can produce flash floods, and topple trees. Forecasting them ahead of time gives people a chance to be safe. Using a circle map, brainstorm the different ways people can stay safe in case of a hurricane. Ideas may include staying inside, staying away from windows, finding a safe interior room, turn off the electricity, turn off major appliances, and staying away from electrical equipment. Hang on to the circle map until the research project at the end of the unit. |
| **Enrichment** | **EXTEND**There are meteorologists called hurricane hunters, who fly planes close to and inside of hurricanes to get more information as to how they work and how to better predict when they are going to happen. Website/video: Ocean Today – “Hurricane Hunters” (2:14): <https://oceantoday.noaa.gov/hurricanehunters/> |
| **Closure** | **EXPLAIN**Book: Hurricanes (Smithsonian Little Explorer) by Martha Rustad, or use myON link: <https://www.myon.com/reader/index.html?a=sle_hurri_s14>The more information scientists can gather about hurricanes, the more prepared they will be when one is coming. It also allows them to inform the public about hurricanes so they have time to prepare and/or evacuate to stay safe. |
| **Assessment** | **EVALUATE**Formative: Check the experiments and journal entries for understanding, including discussing predicting hurricanes. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss hurricanes, as well as reviewing why they are a form of severe weather. Review how knowing the weather ahead of time can give people a chance to be safe. | Discuss hurricanes, as well as reviewing why they are a form of severe weather. Ask the student: Why are hurricanes so dangerous?  | Discuss hurricanes, as well as reviewing why they are a form of severe weather. Ask the student: How is a hurricane like a thunderstorm?  |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures of a hurricane.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather and forecasting, including reviewing the definition of a hurricane. Repeat looking at the flashcards until the student can define a hurricane.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about hurricanes? Are they the worst form of severe weather? Why or why not? |
| **Interactive Technology** |
| App: “NOAA Now” – Weather from NOAAApp: “My Hurricane Tracker & Alerts” – Hurricane and Tornado TrackerApp: “Wind Map: 3D Hurricane Tracker” – Hurricanes, Typhoons & Cyclones |

Lesson 9: Why does the weather need to be forecasted? (Tornadoes)

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| **Learning Target****Objective****Standards** | Weather forecasting helps to prepare for severe weather. Students will understand the importance of weather forecasting, especially as it relates to severe weather.K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, clear 1-liter bottles, washers, duct tape (or a twister tube), large bowls, water, food coloring, colored lamp oil (optional) |
| **Books** | How to Build a Tornado in a Bottle by Lori ShoresTornadoes! By Marcie AboffTornadoes: Be Aware and Prepare by Martha Rustad |
| **Vocabulary** | Tornado: A rotating column of air extending from a thunderstorm to the groundSupercell: A strong type of thunderstorm |
| **Procedures** | **ENGAGE**Ask the students: What is a tornado? Have you ever been in a tornado, or remember seeing one on TV? What do you remember about it? Have students Mix-Pair-Share (<https://www.kaganonline.com/>) with a partner to discuss what they think a tornado might be, and what they noticed about it.Video: “What is a Tornado?” (3:46): <https://www.youtube.com/watch?v=-s3UwOq1P1E>**EXPLORE**Video: “Tornado Facts for Kids!” (8:53): <https://www.youtube.com/watch?v=vH4YT9secVw>Have the class join with their previous partners to make their own tornadoes. Each pair will need two clear 1-liter bottles, a washer, duct tape (or a twister tube), a large bowl, water, food coloring, and colored lamp oil (optional.) Start with two empty, plastic soda bottles. Make sure the bottles are the same size. Fill one bottle 2/3 full of water and attach the twister tube. Attach the second bottle to the other end of the twister tube. Make sure the bottles are screwed on securely so that the water does not leak. If you don’t have a twister tube, place a metal washer on top of the bottle with water. Turn the empty bottle upside down and align the openings of the two bottles. Connect them by wrapping them tightly with duct tape. Quickly turn the bottle over and set it on a table or desk so it’s standing vertically. A few drops of water might fall into the lower bottle, but not much. Start moving the bottles in a circle, as if you were stirring something. At some point, a twister will form, and the water will start spiraling into the lower bottle. Have students draw a picture in their science notebook of their observations, complete with labels.Optional: repeat the instructions but try adding 2 ounces of colored lamp oil to the water. The oil will float on the surface of the water since oil is less dense than water. When the oil and water swirl together, the less dense oil travels down the vortex first and creates a “colored” tornado effect.Optional: Use blue food coloring added to the clear water to see a more defined version of the tornado.**EXPLAIN**Book: How to Build a Tornado in a Bottle by Lori Shores, or use myON link: <https://www.myon.com/reader/index.html?a=hof_torna_f10>Real tornadoes happen when hot air pushes up. Wind whips around a center point, pulling cold air down. The tornado in the bottle works in a similar way. When the bottles are turned over, the air pushes up. Swirling the bottles around makes the water spin around the center. Like wind, the movement pulls the water down.Tornadoes form inside clouds. The tops of clouds hold fast-moving cold air. The bottoms hold slow-moving warm air. When the cold air moves over the warm air, twisting funnels form. Funnels become tornadoes when they touch ground. Tornadoes get their dark color from the dirt they suck up.Book: Tornadoes! By Marcie Aboff, or use myON link: <https://www.myon.com/reader/index.html?a=fgwe_torna_s12>Meteorologists study the weather to try and predict severe weather. Most tornadoes start from a supercell, which is a rotating thunderstorm. The formation of a tornado is so complex, scientists have yet to understand it. Speeds and other factors can be difficult to understand. However, when a tornado may form, meteorologists issue a tornado watch, which means tornadoes are possible in the area. A tornado warning is issued when a tornado is either on the ground or detected by a radar.Forecasting tornadoes ahead of time gives people a chance to be safe. Using a circle map, brainstorm the different ways people can stay safe in case of a tornado. Ideas may include avoiding windows, go into the basement, covering yourself with a mattress, going to an interior hallway if there is no basement, crouching low to the floor, and avoiding heavy objects. Hang on to the circle map until the research project at the end of the unit. |
| **Enrichment** | **EXTEND**People who study tornadoes are called storm chasers. The goal of storm chasers is to try and understand how tornadoes form to keep people safe by knowing when and where a tornado may form.Video: “The 7-Year-Old Storm Chaser” (3:13): <https://www.youtube.com/watch?v=bKS1vasg-L8> |
| **Closure** | **EXPLAIN**Book: Tornadoes: Be Aware and Prepare by Martha Rustad, or use myON link: <https://www.myon.com/reader/index.html?a=wa_tornad_f14>By trying to understand tornadoes, meteorologists can try and keep people safe by trying to predict when and where a tornado might hit. |
| **Assessment** | **EVALUATE**Formative: Check the experiments and journal entries for understanding, including discussing what to do in case of a tornado. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss tornadoes, as well as reviewing why they are a form of severe weather. Review how knowing the weather ahead of time can give people a chance to be safe. | Discuss tornadoes, as well as reviewing why they are a form of severe weather. Ask the student: Why are tornadoes so dangerous?  | Discuss tornadoes as well as reviewing why they are a form of severe weather. Ask the student: Why are tornadoes so difficult to predict and understand? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures of a tornado.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather and forecasting, including reviewing the definition of a flood. Review the pictures until the student can tell you what they are.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about tornadoes? Are they the worst form of severe weather? Why or why not? |
| **Interactive Technology** |
| App: “Tornado Alley.” – Darin EdmondsGame: SciJinks: Tornado Simulator: <https://scijinks.gov/tornado-simulation/>  |

Lesson 10: Why does the weather need to be forecasted? (Floods)

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| **Learning Target****Objective****Standards** | Weather forecasting helps to prepare for severe weather. Students will understand the importance of weather forecasting, especially as it relates to severe weather.K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, small milk cartons, craft sticks, straws, Styrofoam cups, paper clips, rubber bands, masking tape, sand, large plastic tubs, cotton balls, water, stop watch, measuring cup |
| **Books** | Floods: Be Aware and Prepare (Weather Aware) by Renee Gray-WilburnRising Waters: A Book About Floods (Amazing Science: Weather) by Rick Thomas |
| **Vocabulary** | Flood: A large amount of water covering an area of land that is usually dryDam: A barrier preventing the flow of water |
| **Procedures** | **ENGAGE**Ask the students: What is a flood? Have you ever been in a flood, or remember seeing one on TV? What do you remember about it? Have students Mix-Pair-Share (<https://www.kaganonline.com/>) with a partner to discuss what they think a flood might be, and what they noticed about it.Video: “FLOODS – The Dr. Bionics Show/Best Learning Videos For Kids/Peekaboo Kidz” (3:47): <https://www.youtube.com/watch?v=9hQZCiZ21fk>**EXPLORE**Video: BrainPOP: “Floods” (3:02): <https://www.brainpop.com/science/earthsystem/floods/>Video: “Floods explained” (1:51): <https://www.youtube.com/watch?v=qLvLFdy6lVI>Have the class Mix-Freeze-Group (<https://www.kaganonline.com/>) to create groups of 2-6 (depending on the class size) to create a flood barrier. This structure is going to be designed to keep the water from reaching the house. Each group will need a milk carton (the house) and access to various materials, such as: craft sticks, straws, Styrofoam cups, paper clips, rubber bands, masking tape, sand, a large plastic tub, and cotton balls. Give students some time to decorate the milk carton: this will be their “house.” Tell the students they will be building a structure to keep their “house” safe. Put the house in the plastic tub.Video: “How to protect your property from flooding” (2:03): <https://www.youtube.com/watch?v=hDAvZB8vcAc>As a group, students can use the materials provided at the teacher’s discretion to build a barrier around their house. The house does not have to stay on the floor of the plastic tub; however, this is not a strategy you should disclose right away. Give students about 10 minutes to build their barrier. When the group is finished, have them draw a picture of their structure in their science notebooks. When the students are finished with their structure, or the time is up, give the students an opportunity to look at the other structures around the room. Have them examine: What is the same about other structures compared to their own? What is different?After the students have a chance to look around, begin the test. Pour two cups of water into each plastic tub. Using the stopwatch, give each structure 10 seconds to withstand the flood water. Once the test is complete, remove the “house” from the basin. Let each group examine their house. Did it get wet? Have students draw a picture of the results and label the different areas where the house got wet (if applicable.)**EXPLAIN**Book: Floods: Be Aware and Prepare (Weather Aware) by Renee Gray-Wilburn, or use the myON link: <https://www.myon.com/reader/index.html?a=wa_floods_f14>A flood is a rise of water with no place to go. Floods come in all depths, from just a few inches to many feet. Floods can occur all over the world, usually caused by hurricanes, broken dams, rapidly thawing snow or ice, heavy rain, or repeated rains. A flood can happen in a few hours, days, or over weeks. In towns that flood more often than others, people use different strategies to protect their homes. They put sandbags in front of their doors, build their homes on higher ground, and clean out their gutters so they are not blocked. Meteorologists can usually tell in advance when conditions are right for flooding to occur. Scientists work to understand the types of storms that have high precipitation rates to predict if an area will be in danger of flooding.Forecasting floods ahead of time gives people a chance to be safe. Using a circle map, brainstorm the different ways people can stay safe in case of a flood. Ideas may include: avoiding walking or driving through flood waters, not driving over bridges over floodwaters, moving to higher ground, evacuating, and having an emergency plan. Hang on to the circle map until the research project at the end of the unit.Video: “Why Do Floods Happen?” (3:41): <https://www.youtube.com/watch?v=Qe350nm_odA> |
| **Enrichment** | **EXTEND**Give students another opportunity to build a barrier to protect their house based on how the first trial run went. Students can make modifications based on their observations of other groups’ models. Students can document their progress in their science notebooks.Teacher’s note: This project can be extended to several days if applicable. |
| **Closure** | **EXPLAIN**Book: Rising Waters: A Book About Floods (Amazing Science: Weather) by Rick Thomas, or use myON link: <https://www.myon.com/reader/index.html?a=as_floo_s05>As scientists gather information about hurricanes and heavy rain, the more prepared they will be in the event of flooding. With increasing technologies regarding dams, people can be protected in the event of flooding. |
| **Assessment** | **EVALUATE**Formative: Check the experiments and journal entries for understanding, including discussing how to keep a house safe from flooding. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss floods, as well as reviewing why they are a form of severe weather. Review how knowing the weather ahead of time can give people a chance to be safe. | Discuss floods, as well as reviewing why they are a form of severe weather. Ask the student: Why are floods so dangerous?  | Discuss floods, as well as reviewing why they are a form of severe weather. Ask the student: What is the difference between a flood and a flash flood? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures of a flood.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather and forecasting, including reviewing the definition of a flood. Review the pictures and look at the objects until the student understands flooding.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about floods? Are they the worst form of severe weather? Why or why not? |
| **Interactive Technology** |
| App: “FloodWatch” – D5G Technology, LLCApp: “Flood: American Red Cross” – American Red Cross.Game: PBS Kids – “Don’t Flood The Fidgits!” - <http://pbskids.org/designsquad/games/dont_flood/>Game: PBS Kids – “Between the Lions: Flood” - <http://pbskids.org/island/preview/gamepreview.html?btl-flood>  |

Lesson 11: Does the weather change throughout the day?

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| **Learning Target****Objective****Standard** | Weather changes daily and certain features of weather follow known patterns.Students will understand that weather can change, and that the morning is usually cooler than the afternoon.K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks |
| **Books** | True or False? Weather by Daniel Nunn |
| **Vocabulary** | Atmosphere: The layer of gas that surrounds Earth |
| **Procedures** | **ENGAGE**(Teacher’s Note: This lesson should be started in the morning and revisited later in the day to compare temperatures and weather conditions.)Ask students: Does the weather change throughout the day, or does it stay the same? Have students do a Timed Pair Share (<https://www.kaganonline.com/>) to discuss their thoughts. Have students discuss with a partner, then reconvene to answer. Video: “Sesame Street: Grover Weather Monster” (2:37): <https://www.youtube.com/watch?v=tmO9cjsj1zc&t=5s>**EXPLORE**Discuss the fact that weather can constantly change throughout the day. Weather conditions even affect clouds in the sky. Take the entire class outside and ask them to observe the weather: is it hot? Cold? Are there clouds? Is it windy? Take the temperature outside or check on <https://weather.com/> to see what the current weather is. When the class returns inside, use one side of a double bubble map to record their findings. Tell the students that you will be comparing the current weather to the weather later in the day. Ask the students if they think it will be different later, and what those differences will be. Will it be warmer? Cooler?Return outside at the end of the day and discuss what the weather is like, including any noticeable changes. Is it warmer? Cooler? Is there rain, or clouds now? Return inside and add to the double bubble map to compare the beginning of the day weather and the end of the day weather. After sharing as a class, have students meet with their previous partner to discuss their findings.**EXPLAIN**Book: True or False? Weather by Daniel Nunn, or use myON link: <https://www.myon.com/reader/index.html?a=trfl_wther_s13>As the sun rises in the morning, the Earth starts to warm up. The sun provides the Earth with the heat that the plants and animals need to survive. By the time it is the middle of the day, the sun is high up in the sky, and keeps the Earth very warm. As the sun starts to set at the end of the day, there is no longer enough light to warm up the Earth, and the weather starts to cool down, even though our atmosphere keeps in some of the heat that the sun has provided. When the sun goes completely down, the Earth begins to cool off.Weather systems that bring rain, snow, wind, or other extreme forms of weather don’t stay around very long. While it might be raining in the morning, it may not be raining later during the day if the weather has moved on. Using the MeteoEarth website, look at the current temperature, precipitation, cloud cover, wind, and pressure maps that change throughout the day. <http://www.meteoearth.com/> |
| **Enrichment** | **EXTEND**Login to <https://weather.com/> and choose to look at an hourly forecast. Point out the different columns, including the temperature, how it “feels,” the precipitation, humidity, and wind. Explain that a meteorologist is the person who researches and predicts how the weather throughout the day is going to be.  |
| **Closure** | **EXPLAIN**Discuss the double bubble map and review the differences between the beginning of the day and the end of the day, including how the sun warms the Earth and the atmosphere keeps the Earth warm. |
| **Assessment** | **EVALUATE**Formative: Check for understanding and answers on double bubble map, as well as listening to discussions during timed pair share.  |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the ways that weather can change throughout the day, including temperature, wind, and precipitation. Discuss the difference in the different terms with the student and check for understanding. | Discuss the ways that weather can change throughout the day, including temperature, wind, and precipitation. Ask the student: Why would it matter how the temperature changes throughout the day?  | Discuss the ways that weather can change throughout the day, including temperature, wind, and precipitation. Ask the student: Does weather always follow the same pattern as it changes throughout the day? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures of the different terms discussed in the lesson, including clouds, precipitation, and wind.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather. Review the pictures until the student can differentiate between them. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 3)** |
| Ask students: How is the weather related to activities throughout the day? What do we do differently in the morning than we do in the afternoon or evening? |
| **Interactive Technology** |
| Game: Sid the Science Kid weather wheel: <http://pbskids.org/sid/weatherwheel.html>Game: Cat in the Hat weather: <http://pbskids.org/catinthehat/games/weather-transformer> |

Lesson 12: Does weather change throughout the year?

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| **Learning Target****Objective****Standard** | Weather changes throughout the year and certain features of weather follow known patterns.Students will understand that weather usually follows a predictable pattern throughout the year. K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, paper, pictures of trees without leaves (optional), glue, small squares of tissue paper in: white, pink, green, red, orange, yellow |
| **Books** | True or False? Seasons by Daniel Nunn  |
| **Vocabulary** | Seasons: Four different times during the year with different types of weather |
| **Procedures** | **ENGAGE**We know weather changes during the day based on our observations, but does weather stay the same throughout the year? Ask the students: Is the weather the same right now as it was a few months ago? What about during the summer? What is different about the weather in the different times of the year? Give students time to discuss the questions and answers with partners or in groups.Video: BrainPOP jr.: “Seasons” (4:10): <https://jr.brainpop.com/science/weather/seasons/>**EXPLORE**Video: “Time: ‘Four Seasons,’ The Seasons of the Year by StoryBots” (1:13): <https://www.youtube.com/watch?v=NavWWM2iTEw>Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) by asking the following question: How many seasons are there in a year? Students should hold up 4 fingers and get into groups of 4. (Number may be adjusted depending on how many students.) Have each student in the group divide a piece of paper into 4 sections (or provide paper with tree trunks already drawn on them.) Label each of the trees with the four seasons. Students should draw the leaves on each of the trees they see during the different seasons. For example, spring might have a lot of leaves, whereas fall would have leaves all over the ground. Depending on the different part of the country, the trees may look a bit different, so it may be necessary to google “pictures of trees during the different seasons.” Optional: Using small pieces of tissue paper, students can crumple up the tissue and use it as leaves. The spring would have green and pink tissue (for the leaves and flowers); summer would have all green tissue; the fall would have orange, red, and yellow tissue; and the winter would have white (to represent the snow).Video: “The Seasons Song: Scratch Garden” (2:59): <https://www.youtube.com/watch?v=H32W-6CKdfk>**EXPLAIN**Book: True or False? Seasons by Daniel Nunn, or use the myON link: <https://www.myon.com/reader/index.html?a=trfl_ssons_s13>Video: “Seasons Song Video” (4:18): <https://www.youtube.com/watch?v=8ZjpI6fgYSY>As you read (or listen) to the book, as a class, create a tree map to list different characteristics of each season. Discuss how, in different areas, the seasons may look slightly different. For example: in the southwest, the winter may not have snow, but the weather is generally cooler, and the days are shorter.  |
| **Enrichment** | **EXTEND**Pick a season that looks different than the “traditional” season in other parts of the country. For example, the winters may not include snow, or the summers may not get as hot. Ask the students: How are the seasons here different than the pictures of seasons around the country? Have the students draw a fifth tree of your chosen season to represent the weather in their area.  |
| **Closure** | **EXPLAIN**Reiterate that while different areas have different versions of the seasons, the seasons do have similarities. Each part of the year is a little bit different in terms of the temperature, precipitation, and the length of the days. Optional video: “Sesame Street: Eating Cookies All Year With Cookie Monster” (1:57): <https://www.youtube.com/watch?v=1qGdXc2tH3s> |
| **Assessment** | **EVALUATE**Formative: Check for understanding regarding the seasons by checking how the trees were drawn, as well as the answers given while making the tree map. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the four seasons, including how they are different from each other. Review the differences between each season and check for understanding.  | Discuss the four seasons, including how they are different from each other. Ask the student: Is there a big change between winter and summer?  | Discuss the four seasons, including how they are different from each other. Ask the student: If the weather is warm in December, is it still winter? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures representing the different seasons.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different seasons. Repeat reviewing the seasons until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 3)** |
| Ask students: How are the seasons related to the weather? Are the seasons defined by the weather? What about areas where it doesn’t snow during the winter? |
| **Interactive Technology** |
| App: “The Four Seasons – An Earth Day Interactive Book” – TabTale LTDApp: “Kid Season Learning – Toddlers” – Appricot StudioApp: “Natural Seasons by BabyBus” – BABYBUSGame: Sheppard Software: “Seasons”: <http://www.sheppardsoftware.com/scienceforkids/seasons/seasons.htm>Game: TurtleDiary: “Seasons”: <https://www.turtlediary.com/game/seasons.html>Game: Education.com: “Seasons Suitcase Sort”: <https://www.education.com/game/seasons-suitcase-sort/>Game: Clifford – “Stickers for All Seasons”: <http://www.scholastic.com/clifford/play/seasonalstickers/stickers-main.swf>Game: Tvo Kids: “Sticks and Seasons”: <https://tvokids.com/preschool/games/sticks-and-seasons>Game: PBS Learning Media: “Dress for the Season”: <https://vegas.pbslearningmedia.org/resource/evscps.sci.ess.watcyc.dress/dress-for-the-weather/#.WqGvV-jwaUk> |

Lesson 13: Does weather change throughout the year? (Spring)

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| **Learning Target****Objective****Standard** | Weather changes throughout the year and certain features of weather follow known patterns.Students will understand that weather usually follows a predictable pattern throughout the year. K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, glass jars with lids, boiled water, hairspray, ice, cups, glass measuring cup (or kettle) |
| **Books** | Clouds by Erin EdisonExploring Spring by Terri DeGezelle |
| **Vocabulary** | Spring: The transition season from winter to summer, occurring from March through May in the Northern HemisphereCumulus clouds: Clouds that are piled up on top of each other; puffy, usually low-levelStratus clouds: Rain or snow clouds; looking like a huge grey blanket that hangs low in the skyCirrus clouds: Thin, wispy clouds, usually high in the skyNimbus clouds: Thunderstorm clouds that already have rain or snow falling out of it |
| **Procedures** | **ENGAGE**Ask the students: What is it like outside in the spring? What do you notice about the weather? What about the plants? Add to the tree map with any new ideas or thoughts after giving students a chance to share their ideas.Video: BrainPOP jr.: “Spring” (5:05): <https://jr.brainpop.com/science/weather/spring/>**EXPLORE**Video: “Spring is Here Song” (1:11): <https://www.youtube.com/watch?v=Qhv29_M-P5Q>Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) by asking the following question: What is your favorite season? Have students group with others who likes the same season in groups of 4-6 (depending on the class size.) Give each group a glass jar with a lid, an aerosol can (hairspray,) and a cup of ice. Making a cloud: <http://www.kidspot.com.au/things-to-do/activity-articles/how-to-make-a-cloud-in-a-jar/news-story/ef26a01b9ca11d7f44dd607563125ad1>Heat up about half a cup of water in the glass measuring cup until boiling. Have the teacher carefully pour about 2 cm of boiled water into the jar and swirl it around so it heats up the sides of the jar. Have the students turn the lid of the jar upside down and use it as a small container to put in a few cubes of ice. Rest it on top of the jar for a few seconds. Take it off and quickly squirt in some hairspray. Put the lid, with the ice resting on it, back on top of the jar. Watch the cloud form inside of the jar. When it is fully formed, take the lid off and watch the cloud escape. Have students draw a picture of what happened in their science notebook.**EXPLAIN**Book: Clouds by Erin Edison, or use myON link: <https://www.myon.com/reader/index.html?a=wb_cloud_f11>Explain that the jar is a lot like our atmosphere. In order to make a cloud, the atmosphere needs warm, moist air (created with the hot water being trapped in the jar,) cooling, which causes the moisture to rise (cooled by the ice on top of the jar,) and cloud condensation, which is a small particle that floats in the air to help water vapor condense into clouds (sometimes it’s dust or smoke, but in this case, it was the hairspray.) The cloud swirled inside the jar due to the warm air rising and the cold air sinking.Book: Exploring Spring by Terri DeGezelle, or use the myON link: <https://www.myon.com/reader/index.html?a=es_esprin_s12>As you read (or listen) to the book, as a class, add anything newly discovered about to the tree map. Discuss how, in different areas, the seasons may look slightly different. Optional Video: “Sesame Street: Spring Is Here” (3:37): <https://www.youtube.com/watch?v=0FD5sIQS_u0> |
| **Enrichment** | **EXTEND**Video: “Cloud Facts for Kids!” (11:31): <https://www.youtube.com/watch?v=EhLT11hKyok>Discuss clouds, and how the spring often brings rainy weather as the plants start to grow. What are the different types of clouds? Do they look the same or different?  |
| **Closure** | **EXPLAIN**Discuss the different characteristics of spring, including the type of weather, the days getting longer, and the time of the year.  |
| **Assessment** | **EVALUATE**Formative: Check for understanding regarding spring by checking the tree map and discussions during adding more information to spring. Optional: check for understanding of the three main types of clouds. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the spring, and different characteristics separating it from the other seasons. Review the differences between each season and check for understanding.  | Discuss the spring, and different characteristics separating it from the other seasons. Ask the student: Why do you think plants start growing in the spring instead of other seasons? | Discuss the spring, and different characteristics separating it from the other seasons. Ask the student: Do you think spring is at the same time on the other side of the world? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures representing the spring.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore different aspects of spring. Repeat exploring different aspects of spring until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: How would you apply what you learned to develop a game that could be played in the spring? Could it only be played in the spring? Why or why not? |
| **Interactive Technology** |
| App: “Spring Wallpaper – Nature Wallpaper” – Gunvata PatelGame: PrimaryGames: “Spring Games”: <http://www.primarygames.com/seasons/spring/games.php> |

Lesson 14: Does weather change throughout the year? (Summer)

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| **Learning Target****Objective****Standard** | Weather changes throughout the year and certain features of weather follow known patterns.Students will understand that weather usually follows a predictable pattern throughout the year. K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, whole milk, sugar, vanilla, ice, rock salt, chocolate chips, sprinkles, Oreo cookies, 2 qt. freezer bags, gallon freezer bags, measuring cups, measuring spoons, chocolate powder, hand towels or oven mitts, spoons, bowls, ice cream scoop |
| **Books** | Should I Share my Ice Cream? by Mo Willems (optional)Exploring Summer by Terri DeGezelle |
| **Vocabulary** | Summer: The seasons between spring and autumn: in the Northern Hemisphere, the months of June, July, and August |
| **Procedures** | **ENGAGE**Ask the students: What is it like outside in the summer? What do you notice about the weather? What about the plants? Add to the tree map with any new ideas or thoughts after giving students a chance to share their ideas.Video: BrainPOP jr.: “Summer” (5:26): <https://jr.brainpop.com/science/weather/summer/>**EXPLORE**Video: “FROZEN/”In Summer” Song – Official/Official Disney UK” (1:59): <https://www.youtube.com/watch?v=UFatVn1hP3o>Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to find a partner. Ask the students: What is a fun treat to have during the summer? Today they will be making a fun summertime treat. Give each pair half a cup of whole milk, ¼ cup of sugar, 1 tsp vanilla (or 2 tsp chocolate powder), ice, 1 cup of rock salt, a 2 qt. zip-lock bag, and a 1-gallon zip-lock bag.Teacher’s note: premeasure the ingredients and put into cups before the experiment begins.Science Made Fun! Ice Cream: <http://www.sciencemadefunkids.net/experiments.cfm?Exp=7>Have the students fill the 2 qt. zip-lock bag with the milk, sugar, and vanilla. If they wish to add extra ingredients, add them currently. Securely seal the bag. With help, add the ice and rock salt to the 1-gallon zip-lock bag. Place the 2 qt. zip-lock bag inside the 1-gallon zip-lock bag. Seal the bag securely.With their partner, shake the 1-gallon zip-lock bag for 10-15 minutes. The constant shaking motion will promote the freezing process. The more they shake, the closer it will get to hard ice cream. The bag will become very cold to the touch – the students may need to use oven mitts or a towel to cover the bag while shaking. Use the ice cream scoop to serve the ice cream in bowls to students to try. Have students draw a picture of what happened in their science notebook, complete with labels.**EXPLAIN**Book: Should I Share my Ice Cream? by Mo WillemsJust like salt is used on icy roads in the winter, the salt mixed with the ice causes the ice to melt. When the salt encounters the ice, it gets a lot colder as the freezing temperature of the ice is lowered. By lowering the temperature at which the ice is frozen, an environment is created where the milk mixture can freeze. The fat particles in the milk smash into each other and make big molecules of ice cream.Book: Exploring Summer by Terri DeGezelle, or use the myON link: <https://www.myon.com/reader/index.html?a=es_esumm_s12>As you read (or listen) to the book, as a class, add anything newly discovered about to the tree map. Discuss how, in different areas, the seasons may look slightly different. Optional Video: “Summer Song for Kids/The Singing Walrus” (2:31): <https://www.youtube.com/watch?v=mVhh0oATqBI> |
| **Enrichment** | **EXTEND**Ask the students what other treats can be made during the summertime. Have the students ever made popsicles before? Discuss pouring juice into a cup, along with a stick and putting them in the freezer for an hour to make a popsicle. Is this the same as making ice cream? Why or why not?  |
| **Closure** | **EXPLAIN**Discuss the different characteristics of summer, including the type of weather, the days getting longer, and the time of the year.  |
| **Assessment** | **EVALUATE**Formative: Check for understanding regarding summer by observing the discussion while adding to the tree map.  |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the summer, and different characteristics separating it from the other seasons. Review the differences between each season and check for understanding.  | Discuss the summer, and different characteristics separating it from the other seasons. Ask the student: Do you think summer is at the same time on the other side of the world? Why or why not? | Discuss the summer, and different characteristics separating it from the other seasons. Ask the student: Why do you think kids are not in school during the summer? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures representing the summer.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore different aspects of summer. Repeat going over the different items from summer until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about the summer that is different than the spring? Is the summer better than the spring? Why or why not? |
| **Interactive Technology** |
| Game: PBS Kids: Curious George: “Day at the Beach”: <http://pbskids.org/curiousgeorge/games/day_at_beach/day_at_beach.html>Game: Primary Games: “Summer Games”: <http://www.primarygames.com/seasons/summer/games.php> |

Lesson 15: Does weather change throughout the year? (Fall/Autumn)

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| **Learning Target****Objective****Standard** | Weather changes throughout the year and certain features of weather follow known patterns.Students will understand that weather usually follows a predictable pattern throughout the year. K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, maple leaf template, coins, orange/yellow/red/green crayons, cardstock, scissors |
| **Books** | Leaves Fall Down: Learning about Autumn Leaves by Lisa BullardExploring Fall by Terri DeGezelleWhat Do Animals Do in Fall? By Rebecca Felix  |
| **Vocabulary** | Fall/Autumn: The season between summer and winter comprising in the Northern Hemisphere usually from September to NovemberChlorophyll: The green coloring matter found in plants that absorbs energy from the sun to produce food for the plantPigment: The substance giving color to an object  |
| **Procedures** | **ENGAGE**Ask the students: What is it like outside in the fall? What do you notice about the weather? What about the plants? Add to the tree map with any new ideas or thoughts after giving students a chance to share their ideas.Video: BrainPOP jr.: “Fall” (4:42): <https://jr.brainpop.com/science/weather/fall/>**EXPLORE**Video: “Why Do Leaves Change Colors in the Fall?” (3:21): <https://www.youtube.com/watch?v=Xk4-6II8l5Q>Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to find a partner. Ask the students: Why do you think leaves change colors in the fall? Give students a chance to discuss the answer before the project. Give each student the maple leaf template (link below), a coin for rubbing, and orange/yellow/red/green crayons. The Preschool Toolbox: Maple Leaf “Color, Scratch, and Reveal”: <https://thepreschooltoolboxblog.com/fall-leaves-change-colors-playfulpreschool/>Maple Leaf Template: <https://thepreschooltoolboxblog.com/wp-content/uploads/2014/09/Maple-Leaf.pdf>Teacher’s note: Print the maple leaf from the template onto cardstock.Have the students color the maple leaf with the yellow, orange, and red crayons. They may use a combination of colors or just one color. After they have finished coloring, tell them the green crayon is the chlorophyll that is inside of each leaf. Have them use the green crayons to color the leaf until they can no longer see the other colors underneath. Tell the students that it is now fall, and the sun isn’t shining as much during the day. Using the coin, have the students scratch off the green crayon to reveal the colors underneath. As the chlorophyll fades, the fall colors in the leaf are revealed. Have students draw a picture of the different leaves in the different stages in their science notebooks, complete with labels.**EXPLAIN**Book: Leaves Fall Down: Learning about Autumn Leaves by Lisa Bullard, or use myON link: <https://www.myon.com/reader/index.html?a=aut_leave_f10>Explain how the red, orange, and yellow colors are inside of the leaf all the time; but the green chlorophyll is seen the easiest because it captures the energy from the sun to make sugar the tree can use for food. All the colors have a special job, but because chlorophyll is the most important, there is more of in the leaves than any other color. As the days get shorter and less of the sun is hitting the leaves on the trees, there is less chlorophyll inside of the leaves. When this happens, it is easier to see the other colors. The energy from the leaves flows into the tree, and as the leaves no longer have a job to do, they fall off the tree.Book: Exploring Fall by Terri DeGezelle, or use the myON link: <https://www.myon.com/reader/index.html?a=es_efall_s12>As you read (or listen) to the book, as a class, add anything newly discovered about the fall to the tree map. The students may live in an area where the leaves don’t change colors right away. Discuss how, in different areas, the seasons may look slightly different. Optional Video: “Autumn/Fall Video for Kids & Toddlers: Reading” (1:23): <https://www.youtube.com/watch?v=Fk4K1f03DCc> |
| **Enrichment** | **EXTEND**Discuss what animals do in the fall. With the winter coming, how do they think the animals will prepare? Will it be easier or harder to find food as the weather gets colder?Book: What Do Animals Do in Fall? By Rebecca Felix  |
| **Closure** | **EXPLAIN**Discuss the different characteristics of fall, including the type of weather, the days getting shorter, and the time of the year.  |
| **Assessment** | **EVALUATE**Formative: Check for understanding regarding the fall by observing the students while they add items to the tree map, as well as observing the leaf project.  |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the fall, and different characteristics separating it from the other seasons. Review the differences between each season and check for understanding.  | Discuss the fall, and different characteristics separating it from the other seasons. Ask the student: Do you think fall is at the same time on the other side of the world? Why or why not? | Discuss the summer, and different characteristics separating it from the other seasons. Ask the student: Why do you think the needles on pine or evergreen trees not change colors during the fall? What about palm trees? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures representing the fall.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore different aspects of fall. Repeat going over the items from the fall until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about the fall in different parts of the country? Is it the same everywhere? Why or why not? |
| **Interactive Technology** |
| App: “Jiggy For Scenic Fall Leaves” – StudentShortcuts Inc.Game: PrimaryGames: “Fall Games”: <http://www.primarygames.com/seasons/fall/games.php> |

Lesson 16: Does weather change throughout the year? (Winter)

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| **Learning Target****Objective****Standard** | Weather changes throughout the year and certain features of weather follow known patterns.Students will understand that weather usually follows a predictable pattern throughout the year. K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, baking soda, cold water, vinegar, squirt bottles, large bowls, measuring cups, snow glitter, newspapers, plastic cups, peppermint extract (optional) |
| **Books** | Snow (Weather Wise) by Helen Cox CannonsExploring Winter by Terri DeGezelleAll About Animals in Winter by Martha E.H. Rustad |
| **Vocabulary** | Winter: The coldest season of the year between autumn and springSnow: Small, white, ice crystals formed directly from the water vapor of the air Water Vapor: Water in the form of a vapor or gas |
| **Procedures** | **ENGAGE**Ask the students: What is it like outside in the winter? What do you notice about the weather? What about the plants? Add to the tree map with any new ideas or thoughts after giving students a chance to share their ideas.Video: BrainPOP jr.: “Winter” (4:57): <https://jr.brainpop.com/science/weather/winter/>**EXPLORE**Video: “Where Do Snowflakes Come From?” (3:41): <https://www.youtube.com/watch?v=-M48RfaWcWA>Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) by asking: What is your favorite season? Give students a chance to mingle and find other group members who have the same answer to form groups of 4-6 (depending on the class size.) Ask the students: What happens to snow when it gets warm outside? Give students a chance to discuss the answer before the project. Give each group 2 cups of frozen baking soda (pre-measured,) 1 cup of cold water, snow glitter, and peppermint extract (optional: to be added by the teacher.) The teacher will need a spray bottle of vinegar for the end of the experiment.Growing a Jeweled Rose: Erupting Snow Recipe: <http://www.growingajeweledrose.com/2013/01/erupting-snow-recipe.html>Teacher’s note: Freeze the baking soda ahead of time and measure out the ingredients.Have each group lay down newspapers under a large mixing bowl. Students should pour 2 cups of frozen baking soda into a large bowl. Then, slowly add more cold water and mix, slowly adding more water and mixing until the desired consistency is reached. Water can be used to create different snow consistencies, but the idea is to use roughly one-part water and two parts baking soda. Add some snow glitter and a few drops of peppermint extract (optional.)To make the snow “magically erupt,” after they are finished playing with it, students can use the squirt bottles of vinegar to make their snow “magically erupt.” They can also try dropping their snowballs into a bowl of vinegar to make a “snow avalanche.” Have students draw pictures in their science notebooks of the different types of snow, including the eruption and avalanche. Label the drawings.**EXPLAIN**Book: Snow (Weather Wise) by Helen Cox Cannons, or use myON link: <https://www.myon.com/reader/index.html?a=ww_snow_f14>Snow forms when water vapor in the atmosphere freezes into ice crystals. It forms in a variety of different shapes. Snow also forms in a variety of different shapes. It is a form of precipitation just like rain, hail, and sleet. Book: Exploring Winter by Terri DeGezelle, or use the myON link: <https://www.myon.com/reader/index.html?a=es_ewinte_s12>As you read (or listen) to the book, as a class, add anything newly discovered about the fall to the tree map. The students may live in an area where there is no snow on a regular basis. Discuss how, in different areas, the seasons may look slightly different. Optional Video: “Sesame Street Ernie Plays A Guessing Game About Winter Clothes For The Cold Snow” (2:49): <https://www.youtube.com/watch?v=DM853YR-UPU> |
| **Enrichment** | **EXTEND**Discuss what animals do in the winter. Ask the students: Do all the animals do the same thing? How do they find food? Book: All About Animals in Winter by Martha E.H. Rustad, or use myON link: <https://www.myon.com/reader/index.html?a=cw_anwin_f15>   |
| **Closure** | **EXPLAIN**Discuss the different characteristics of winter; including the type of weather, the days getting shorter, and the time of the year.  |
| **Assessment** | **EVALUATE**Formative: Check for understanding regarding winter while discussing the tree map, as well as observations during the snow experiment.  |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the winter, and different characteristics separating it from the other seasons. Review the differences between each season and check for understanding.  | Discuss the winter, and different characteristics separating it from the other seasons. Ask the student: Do you think winter is at the same time on the other side of the world? Why or why not? | Discuss the winter, and different characteristics separating it from the other seasons. Ask the student: Why do you think different animals have different behaviors? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw pictures representing the winter.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore different aspects of winter. Repeat exploring different aspects of winter until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: What do you notice about the winter in different parts of the country? Is it the same everywhere? Why or why not? |
| **Interactive Technology** |
| Game: PBS Kids: “Happy Holidays”: <http://pbskids.org/holidays/>Game: PrimaryGames: “Winter Games”: <http://www.primarygames.com/seasons/winter/games.php>Game: Interactive Sites for Education: “Winter: Snowmen, Snowflakes, and Gingerbread”: <http://interactivesites.weebly.com/winter.html>Game: Coolmath Games: “Winter Holiday Games”: <https://www.coolmath-games.com/1-winter-holiday-games> |

Lesson 17: How does sunlight affect Earth’s surfaces?

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| **Learning Target****Objective****Standard** | Sunlight affects different surfaces on Earth in different ways.Students will observe that different colors are affected differently by light.K-PS3-1: Make observations to determine the effect of sunlight on Earth’s surface. |
| **Materials** | Computer, white boards, white board markers, pencils, science notebooks, BrainPOP jr. login, black paper, white paper, cups, ice, zipper sandwich bags, stopwatch, heat lamp (substitute for sun) |
| **Books** | Sunlight by Erin Edison |
| **Vocabulary** | Sun: The star in the center of the solar system; life on Earth depends on light and heat from the sunAbsorb: To take in or soak upReflect: To move in one direction, hit a surface, and then quickly move in a different direction |
| **Procedures** | **ENGAGE**Review the definition of weather. Weather is based on temperature, precipitation, and wind. Ask the students: Where does the heat come from to change the temperature? Does the sun feel different in the shade? What about in the water? Video: “The Sun Song: Educational Science Video for Kids: Scratch Garden” (2:06): <https://www.youtube.com/watch?v=OBnDKfHtcd0>**EXPLORE**Video: “Outer Space: ‘I’m So Hot,’ The Sun Song by StoryBots” (1:59): <https://www.youtube.com/watch?v=t-kzdR93bqw>Ask the students: If you wanted to bring a cup of ice water outside, should you bring it in a white cup or a black cup? Have students Find Someone Who (<https://www.kaganonline.com/>) agrees with them on which cup will heat up first. Ask the students: How could we see if you are correct? Have students make predictions about which surface will heat up faster. Record their responses on a tally chart or bar graph. Remind them that it is okay to be wrong, and that scientists often learn more from an incorrect prediction than a correct one. In their partners, give each student: a piece of black paper, a piece of white paper, two ice cubes, and two zip-lock sandwich bags.If the weather permits, take the students outside for the activity. If not, use a heat lamp and scale down the activity so only one set of materials is being used. Have the students put one ice cube in each sandwich bag. Place the black and white papers next to each other in a sunny spot. Put one bagged ice cube on the white paper, and one bagged ice cube on the black paper. Have students draw and label a picture of their experiment in their science notebook. Use the timer and let the ice cubes sit out in the sun for about 5 minutes. Have students make observations at the 5-minute mark. Ask the students: What do you notice so far? Which ice cube do you think is melting faster?After another 5 minutes (10 minutes total,) have the students take the ice cubes and papers back inside. Have them record the results of their experiment. Ask: What happened to the ice cube on the white paper? How about on the black paper? Why do you think that happened? Which color should I use for my cup? Why?**EXPLAIN**Dark surfaces such as the black paper absorb more light, so the black paper will get warmer faster. White paper reflects the light, so it takes longer to get warmer. The ice will melt faster as the black paper heats up quicker than the white paper.Book: Sunlight by Erin Edison, or use myON link: <https://www.myon.com/reader/index.html?a=wb_sunl_f11>Ask the students: What colors do you think it would be best during the summertime? Why? |
| **Enrichment** | **EXTEND**Students can take quick observations to see how the sun affects different areas. Students will go (either in groups or as a class) to three different areas: the classroom, outside in the shade, and outside in the sun – and try to determine or feel the differences in warmth in each of the areas. Students should stay in each area for several minutes to determine which one has the most warmth. Option: use ice cubes in baggies in the three different areas and compare which one melts the fastest. |
| **Closure** | **EXPLAIN**Video: BrainPOP jr.: “Sun” (6:13): <https://jr.brainpop.com/science/space/sun/>Discuss with students the results of their experiment, and why they believe there were differences in temperature from the classroom to the shade to the sun. |
| **Assessment** | **EVALUATE**Review the KWL chart from the beginning of the unit. Check for understanding.Formative: Review which color made the ice melt the fastest. Ask for reflection on the experiment completed with the different surfaces. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the sun’s effect on different surfaces. Compare the results of the experiment to the student’s own experience to further understanding. | Discuss the sun’s effect on different surfaces. Ask the student: Why would it be important to know the sun’s effect on the surface areas?  | Discuss the sun’s effect on different surfaces. Ask the student: Why is it important to know what areas are shady and which are not when it comes to landscaping a house? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student draw the different surface areas tested, including labeling how the sun affected them.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different ways the sun affects surfaces. Repeat the motions with them until they can tell you what they are. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 3)** |
| Ask students: What would happen if you were designing a water park? What color would you make the slides? What about the ground? What would you want to include? |
| **Interactive Technology** |
| App: “DIY Sun Science” – The Lawrence Hall of ScienceApp: “Sundial – Solar & Lunar Times” – With custom alerts |

Weather Activity: Weather Observations (3-4 Weeks)

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| **Learning Target****Objective****Standard** | Students will make observations to describe weather patterns over time.Students will investigate and record the different daily weather patterns over a significant amount of time.K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, science journals, pencils, blank individual calendars, large blank calendar for classroom (anchor chart), thermometer, wind vane (from previous experiment – optional)  |
| **Books** | Days of the Week by Terri Dougherty |
| **Vocabulary** | Meteorologist: A person who studies the science that deals with atmosphere and weather |
| **Procedures** | **ENGAGE**Ask the students: Do you think weather changes every day? We know weather can change throughout the day, and the seasons are different, but what about throughout a week, or a month? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to predict what will happen as weather is observed over the course of a month.Video: “Sesame Street: Kermit’s Weather Calendar” (5:13): <https://www.youtube.com/watch?v=8dAp78XJUsQ&t=18s>**EXPLORE**Each student will be making their very own calendar to record the weather over the course of a month, including the temperature, precipitation, and wind. Teacher’s note: This activity can be done on its own, or simultaneously with other science activities – possibly integrated into calendar time (if applicable.) Video: “Be a Weather Watcher” (3”58): <https://www.youtube.com/watch?v=Uo8lbeVVb4M&t=4s>Give each student a blank calendar. Write the name of the month (or months depending on when the observations are set to begin and end.) Fill in the days for each month for a duration of 4-5 weeks. Explain to the class they will be writing down the weather every school day for a month to see if there are any patterns. As a class, make a key with symbols of the choosing of the class. For example, a sun might mean sunny; a cloud might mean cloudy, a wind cloud might mean windy; a raindrop might mean rainy; and so on. The next thing to decide would be the time of day to check the weather. Because the weather changes throughout the day, it is important to check the weather at the same time each day. The time can vary depending on what works for the class.Finally, the class needs to decide how the weather is going to be measured. Will they just be doing what they can see? Will they include the temperature? How are these different aspects of the weather going to be measured? Make sure to set up the class calendar the same way the individual calendars are being set up.Optional: Use the kids’ weather report website, as well as the weather channel site, to compare different weather reports used. Weather Report For Kids: <https://kidsweatherreport.com/>The Weather Channel: <https://weather.com/>Once the calendars are set up, if it is close to the agreed-upon time, make the first observation. Use whatever tools you decided on as a class and record the data every day for 3-4 weeks.After a week, look at the weather. Ask the class: How has the weather changed? How has it stayed the same? Based on the weather this week, do you think next week will be the same? Why or why not? Write down the predictions on a circle map based on the class observations.**EXPLAIN**Book: Days of the Week by Terri Dougherty, or use myON link: <https://www.myon.com/reader/index.html?a=rr_dweek_s06>Observing the daily weather is a part of a regular routine for many people. It helps people to decide what to wear and what activities they can do. By observing the weather, meteorologists can also develop weather forecasts. As meteorologists keep track of the weather over time in a certain area, they can also keep track of the climate of an area and determine if there are any major changes in the area. Forecasting the weather, as previously studied, can also help predict severe weather and keep people safe. |
| **Enrichment** | **EXTEND**After 3-4 weeks, look at the data and ask the students: What do you notice? How is the weather changing? Depending on the time of year the calendar is completed, tie the observations into the change of seasons. Make a line graph to show the change in temperature over time.Ask the class: What do you think the weather will be next month? Do you think the pattern will stay the same? Why or why not?  |
| **Closure** | **ELABORATE**By examining the weather every day, students can see whether there is a pattern or not. A weather pattern occurs when the weather stays the same for days or weeks at a time. Patterns are tied to the seasons, and when a weather pattern lasts too long, severe weather can occur. Meteorologists log and keep track of all weather and patterns to make sure they can prepare people for extreme weather and keep them safe. |
| **Assessment** | **EVALUATE**Formative: Check the students’ journals and observations for understanding, as well as listening to student-led discussions. Summative: See assessment. |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss how the weather changed over the course of the observation, and the correlation to the season (or season change) happening. Review the student’s science notebook to check for understanding.  | Discuss how the weather changed over the course of the observation, and the correlation to the season (or season change) happening. Ask the student: What did you notice about the weather? Did it stay the same or change? Why? | Discuss how the weather changed over the course of the observation, and the correlation to the season (or season change) happening. Ask the student: Could you use your observations to predict next month’s weather? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student discuss different weather observations.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of weather observed. Repeat the terms with them until they can explain different types of weather. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: How would you apply what you learned to develop a weather forecast for the same month next year? Do you think it would be exactly the same? Why or why not? |
| **Interactive Technology** |
| App: “Weather 15 Days” – Tutiempo Network S.L.App: “MyWeather – 10-Day Forecast” – Notification, Widgets & Themes |

**Weather Observation Assessment**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Draw and label one of the days observed over the past few weeks, including temperature and wind.

Write 3 facts about the days you observed. (Example: Which weather was observed the most often? Did it snow? Why or why not?)

1.

2.

3.

Weather Activity: Cloud Observations (3-4 Weeks)

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| **Learning Target****Objective****Standard** | Students will make observations to describe cloud patterns over time.Students will investigate and record the different cloud observations over a significant amount of time.K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time. |
| **Materials** | Computer, white boards, white board markers, science journals, pencils, blank individual calendars, large blank calendar for classroom (anchor chart)  |
| **Books** | Clouds by Erin EdisonCloudy with a Chance of Meatballs by Judith Barrett (optional) |
| **Vocabulary** | Meteorologist: A person who studies the science that deals with atmosphere and weatherClouds: A large collection of very tiny droplets of water or ice crystalsCumulonimbus Clouds: A dark, gray cloud, usually holding rain or another form of precipitationStratus Clouds: A cloud that forms in low (sometimes fog) dark layers, usually covering all or most of the skyCumulus Clouds: Thick, fluffy clouds that look like a big pile of cotton balls, usually on a sunny dayCirrus Clouds: A wispy white cloud at a high altitude, usually with a change in weatherReflect: To move in one direction, hit a surface, and then quickly move in a different direction |
| **Procedures** | **ENGAGE**Ask the students: Do you think clouds change every day? We know weather can change, and the seasons are different, but what about throughout a week, or a month? Have students StandUp-HandUp-PairUp (<https://www.kaganonline.com/>) to predict what will happen as clouds are observed over the course of a month.Video: “Cloud Facts for Kids!” (11:31): <https://www.youtube.com/watch?v=EhLT11hKyok>**EXPLORE**Each student will be making their very own calendar to record the clouds over the course of a month. Students can also record the precipitation (if any) to go along with their clouds. Teacher’s note: This activity can be done on its own, or simultaneously with other science activities – possibly integrated into calendar time (if applicable.) Book: Clouds by Erin Edison, or use myON link: <https://www.myon.com/reader/index.html?a=wb_cloud_f11>Give each student a blank calendar. Write the name of the month (or months depending on when the observations are set to begin and end.) Fill in the days for each month for a duration of 4-5 weeks. Explain to the class they will be drawing a picture of the clouds they see during every school day for a month to see if there are any patterns. As a class, make a key with pictures of different types of clouds. Review 4 main types of clouds:* Cirrus clouds will be a wispy, white cloud at a high altitude
* Cumulus clouds are thick, fluffy clouds that look like a big pile of cotton balls, usually on a sunny day
* Cumulonimbus clouds are dark, gray clouds, usually holding rain or other precipitation
* Stratus clouds are clouds that form in low, dark layers, usually covering most or all the sky

The next thing to decide would be the time of day to check on the clouds. Because the weather changes throughout the day, it is important to check the weather at the same time each day. The time can vary depending on what works for the class.Finally, as a class, create a circle map to create different ways to describe the clouds. Students may include words such as gray, white, puffy, flat, dark, big, small, wispy, thin, and moving.Every observation day take the students outside to draw a picture of the clouds in their science notebooks. Below the picture, have the students write: “I saw \_\_\_\_\_\_\_ clouds. They were \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_.” Students should fill in the first blank with the type of clouds they see; the second and third blanks should be adjectives brainstormed in the circle map.After a week, look at the clouds. Ask the class: How have the clouds changed? How have they stayed the same? Based on the clouds this week, do you think next week will be the same? Why or why not? **EXPLAIN**Video: “What Are Clouds Made Of?” (3:36): <https://www.youtube.com/watch?v=DigBbR3FeP8>Look at the cloud cover map on the MeteoEarth website: <http://www.meteoearth.com/>Observing the clouds is a big part of what meteorologists do. The clouds have an enormous influence on the Earth’s climate and weather. Clouds are the key regulator of the planet’s average temperature. Some clouds contribute to the cooling because they reflect some of the sun’s energy. Other clouds contribute to warming because they act like a blanket and trap some of the energy from the Earth. Different types of clouds also indicate different types of weather, which can also help scientists in predicting severe weather. Observations are important for improving and validating models of the Earth’s climate, as well as for seasonal and long-term climate predictions. |
| **Enrichment** | **EXTEND**After 3-4 weeks, look at the data and ask the students: What do you notice? How are the clouds changing? Create a graph as a class to show which clouds have been seen the most frequently. Ask the class: What do you think the clouds will be like next month? Do you think the pattern will stay the same? Why or why not? Optional book: Cloudy with a Chance of Meatballs by Judith Barrett |
| **Closure** | **ELABORATE**Meteorologists study the clouds to understand the weather. Clouds form as warm air rises in the atmosphere and cools down. All air contains some water vapor, and warm air can hold more water vapor than cold air. As warm air cools, the water vapor turns into tiny droplets of water or ice. As more and more air cools down, more droplets form, and they eventually become a cloud. |
| **Assessment** | **EVALUATE**Formative: Check the students’ journals and observations for understanding, as well as listening to student-led discussions. Summative: See assessment. |

Differentiated Instruction

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| --- | --- | --- |
| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss how the clouds changed over the course of the observation, and the correlation to the season (or season change) happening. Review the student’s science notebook to check for understanding.  | Discuss how the clouds changed over the course of the observation, and the correlation to the season (or season change) happening. Ask the student: What did you notice about the clouds? Did they stay the same or change? Why? | Discuss how the clouds changed over the course of the observation, and the correlation to the season (or season change) happening. Ask the student: Could you use your observations to predict next month’s cloud patterns? Why or why not? |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student discuss the different types of clouds.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore the different types of clouds observed. Repeat the different types of clouds until there is a differentiation and understanding.*Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: How would you apply what you learned to develop a cloud forecast for the same month next year? Do you think it would be the same? Why or why not? |
| **Interactive Technology** |
| App: “Field Guide to Clouds” – University Corporation for Atmospheric ResearchApp: “SSEC-ISEE/JPSS” – UW-Madison SSECGame: BBC Home: “What is weather? Clouds” - <http://www.bbc.co.uk/schools/whatisweather/aboutweather/cloud.shtml> |

**Cloud Observation Assessment**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Draw and label one of the days observed over the past few weeks, including any precipitation.

Write or draw three of the kinds of clouds, and the type of weather they bring.

1.

2.

3.

**Earth Science Unit Assessment**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Look at the forecast for this week to answer the question.

Season: Spring This week’s forecast:

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| --- | --- | --- | --- | --- |
| Monday | Tuesday | Wednesday | Thursday | Friday |
|  |  |  |  |  |

My forecast for Friday is:

I think this will happen because:

2. It is important for meteorologists to study the weather because:

 a) It’s fun

 b) It can help predict severe weather

 c) The clouds can be tricky

 d) Animals need to know what is going to happen

3. One type of severe weather is:

 a) Clouds

 b) Earthquakes

 c) Sunlight

 d) Tornadoes

4. What happens when the sun shines on a snowman?

 a) The snowman will grow

 b) The snowman will stay the same

 c) The snowman will melt

 d) The snowman will come to life

5. Write down three words to describe the weather outside right now.

6. What are the names of the four seasons?

7. Which season is the coldest in this part of the world?

8. Which season is the hottest in this part of the world?

9. Draw a picture of a type of severe weather with labels, including how people stay safe.

10. Write down three things that a meteorologist does and uses for their job.

11. Is it hotter in the sun or in the shade? Why?

12. Draw a picture of your favorite season with labels and describe why it is your favorite.

Student Research Project: What should be put in a severe weather emergency kit?

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| **Learning Target****Objective****Standard** | Meteorologists prepare people to be safe by forecasting severe weather.Students will pick a type of weather to research and discuss what they would put in a kit to stay safe.K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.W.K.7: Participate in shared research and writing projects (e.g., explore several books by a favorite author and express opinions about them.) RI.K.3: With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.SL.K.1: Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.SL.K.5: Add drawings or other visual displays to descriptions as desired to provide additional detail.L.K.1a: Print many upper- and lowercase letters.L.K.1f: Produce and expand complete sentences in shared language activities. |
| **Materials** | Computer, white boards, white board markers, science journals, pencils  |
| **Books** | Floods: Be Aware and Prepare by Renee Gray-WilburnHurricanes: Be Aware and Prepare by Renee Gray-WilburnTornadoes: Be Aware and Prepare by Martha RustadA Stormy Surprise by Jessica Gunderson |
| **Vocabulary** | Emergency: An unexpected and usually dangerous situation that needs immediate action |
| **Procedures** | **ENGAGE**Ask the students: What are the different types of extreme weather? Review the different types of extreme weather by using the circle maps created throughout the unit. Within each circle map, review the different characteristics of each type of extreme weather. Flooding involves a lot of water and storms; tornadoes involve wind and seeking shelter underground; and so on.Ask the students: What do you think you would need for emergency supplies in a flood? What about in a tornado, or a hurricane? Do you think they would be the same? Ask students to Mix-Pair-Share (<https://www.kaganonline.com/>) to brainstorm about the different items they would need to put into a kit for each type of weather, and to see if any of them would be the same for multiple scenarios. **EXPLORE**Introduce the different books the students will be able to use to write their research. Book: Floods: Be Aware and Prepare by Renee Gray-Wilburn, or use the myON link: <https://www.myon.com/reader/index.html?a=wa_floods_f14>Book: Hurricanes: Be Aware and Prepare by Renee Gray-Wilburn, or use the myON link: <https://www.myon.com/reader/index.html?a=wa_hurric_f14>Book: Tornadoes: Be Aware and Prepare by Martha Rustad, or use the myON link: <https://www.myon.com/reader/index.html?a=wa_tornad_f14>Book: A Stormy Surprise by Jessica Gunderson, or use the myON link: <https://www.myon.com/reader/index.html?a=kr_elect_s08>Have the class Mix-Freeze-Group (<https://www.kaganonline.com/>) to create groups of 4-6 (depending on class size) based on which form of severe weather they would like to study. Students should read or look at the books carefully to determine what they would need in each scenario. Encourage students to think about which items they would need, and why. In their science notebooks or on a separate sheet of paper, each member of the group should write down or draw a picture of 5 different items to have in a backpack in case of an emergency. Once the items are finished, each group should share what they would put in their bags, and why they would put the items there. Give each group a chance to share. At the end, make one “master list” on a new circle map of all the items they should put into a disaster supply kit. Ideas may include water, food, a battery powered radio, flashlight, first aid kit, extra batteries, a whistle, dust mask, and cell phone. Students may need several days to complete the research activity.**EXPLAIN**Being prepared means having food, water, and supplies to last for at least 72 hours. A disaster supplies kit is a collection of basic items your household may need in the event of an emergency. Emergency kits should be stocked and kept in a cool, dry place where all family members know where it is.Meteorologists forecast the weather to predict severe forms to keep people safe. By having an emergency kit, when severe weather hits, people have more of a chance to have supplies that they need rather than having to scramble to put things together. Designing a kit based on the type of weather in each area can help ensure the correct items are being used as well.  |
| **Enrichment** | **EXTEND**Kids’ Emergency Preparedness Activity Guide: <https://www.smgov.net/uploadedFiles/Departments/OEM/Preparedness/KidsActivityGuide.pdf>Discuss why additional items may need to be added to emergency kits depending on the family. For example, someone in the family who takes medication may need to have a supply in their kit in case of an emergency. |
| **Closure** | **ELABORATE**Being prepared for an emergency isn’t just about staying safe during a disaster: it’s also about staying comfortable, clean, fed, and healthy afterwards. Families should work together to build an emergency kit before an emergency strikes.  |
| **Assessment** | **EVALUATE**Summative: See rubric |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss the different types of items needed for an emergency kit. Student may require assistance in writing or drawing and can be paired up with a student at a higher level.  | Discuss the different types of items needed for an emergency kit. Student may be able to work more independently with teacher support. | Discuss the different types of items needed for an emergency kit. Student may be able to work completely independently, as well as being paired with a student of a lower ability level. |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student discuss different items for an emergency kit and why they are needed.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore different items for an emergency kit and why they are needed. Repeat the different items and descriptions until they can be repeated and explain. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 2)** |
| Ask students: How would you apply what you learned to develop a kit for a longer amount of time? What else would you need for 7 days? What about 2 weeks? |
| **Interactive Technology** |
| App: “Aware & Prepare” – Indian River CompanyGame: Ready.gov: “Be a Hero…and Build a Kit!”: <https://www.ready.gov/kids/games/data/bak-english/index.html>Game: Disaster Hero: <http://www.disasterhero.com/> |

Kindergarten Writing Rubric

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| **Standard** | **Exceeds Expectations - 3** | **Meets Expectations - 2** | **Below Expectations - 1** |
| K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. | Student included many details about responding to severe weather. | Student included some details about responding to severe weather. | Student did not include details about responding to severe weather. |
| W.K.7: Participate in shared research and writing projects (e.g., explore several books by a favorite author and express opinions about them.) | Student participated fully in research. | Student somewhat participated in research. | Student did not participate in class research. |
| RI.K.3: With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text. | Student fully made the connection between severe weather and how to respond. | Student somewhat made the connection between severe weather and how to respond. | Student did not make the connection between severe weather and how to respond. |
| L.K.1a: Print many upper- and lowercase letters. | Student prints most upper- and lowercase letters in words appropriately. | Student prints some upper- and lowercase letters in words appropriately. | Student does not prints upper- and lowercase letters in words appropriately. |
| L.K.1f: Produce and expand complete sentences in shared language activities. | Student produced and expanded at least one sentence. | Student produced and expanded one sentence. | Student did not expand or produce a sentence. |
| SL.K.5: Add drawings or other visual displays to descriptions as desired to provide additional detail. | Student drew a picture of at least 5 items for their kits and labeled them appropriately. | Student drew pictures of 2-4 items for their kits and/or labeled them appropriately. | Student did not draw pictures of items for their kits or label them appropriately. |
| SL.K.1: Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups. | Student fully participated in class discussions. | Student somewhat participated in class discussions. | Student did not participate in class discussions. |
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Points: \_\_\_\_\_\_ / \_\_\_\_\_\_\_= \_\_\_\_\_\_\_\_%

Comments:

STEM Unit Project

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| **Learning Target****Objective****Standards** | Engineering design is a process used to solve real world problems. Students willuse the five-step engineering design process to solve problems.Students will design and build a structure that will reduce the warming effect of sunlight on an area.K-PS3-2: Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. SL.K.1a: Followed agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about topics and texts under discussion.) |
| **Materials** | Computer, paper, pencils, heat lamp (optional,) black construction paper (9X12,) white construction paper (9X12,) popsicle sticks, tongue depressors, masking tape, ice cubes, sandwich or snack-sized bags |
| **Vocabulary** | Engineer: A person who designs and builds things to solve specific problemsDesign: A plan produced to show the workings of an object before it is built or madeStructure: Something that is built by putting parts together and usually stands on its ownShade: An area of slight darkness produced when something blocks the light of the sun |
| **Design Process** | **ASK**  Identify the problem. Identify the constraints**IMAGINE** Identify some possible solutions**PLAN** Draw a plan and identify the materials**CREATE** Use the plan and create. Test it!**IMPROVE** Modify your design to make it better. Test it out! |
| **Procedures** | **ASK** Discuss the idea of being shaded. When it is hot outside, some people like to find some shade. What does the word shade mean? Give students a moment to discuss. “Shaded” means to have the sun blocked. On a hot day, people can stay cooler in the shade. Some states and areas get a lot of sunshine throughout the day. Nevada gets over 290 days of sunshine through year. It is good to stay warm, but the heat from the sun can cause many problems such as sunburn or heat stroke and can cause plastic or other materials to break down. Ask the students: What types of things might provide shade? Using a circle map, brainstorm some ideas. Answers may include: trees, hats with brims, umbrellas, buildings, canopies, and tents.To test the structure, students will be using their structure to prevent an ice cube from melting. This can be tested outside or by using a heat lamp. Video: “’Stay Safe in the Sun’ Song: Doc McStuffins: Disney Junior” (1:44): <https://www.youtube.com/watch?v=4H6P_n3k6xc>.Have students Mix-Freeze-Group (<https://www.kaganonline.com/>) to form groups of 3-4 (depending on class size.) Each group is going to create a structure to reduce the effects of the sun. Show examples of shades online by searching “sun shades for backyard” and exploring the different images.**IMAGINE** Explain to the students that they will be making a shade structure to keep the area underneath the structure cool so an ice cube doesn’t melt. One ice cube will be placed directly in the sun, and each group will have their own ice cube they will need to protect. By testing the structures with ice, they will be able to see which structure was the most effective.Show the students the materials they will be able to use, including: black construction paper, white construction paper, popsicle sticks, tongue depressors, and masking tape. Review the previous lesson (17) regarding colors of paper and which is better for preventing heat.As a class and as a group, have the students discuss what kind of structure they would like to make. Discuss the following:What is the problem that they need to solve? (Preventing the ice from melting.)Who has the problem? (The students and teacher.)Why is the problem important to solve? (People may not be able to afford air conditioning or may not have access to it. It is important to have an alternative structure to keep cool.)**PLAN**Let students know their job is to work together to brainstorm an idea of how to solve a problem by creating a structure that will protect an ice cube from melting. Using their science notebooks, the students should draw a picture of what they would like to build. Make sure as they explore their ideas they are using something that will shade the ice cube, so it will take a longer time to melt. Students should label their drawings to make a successful prototype. Allow students enough time to make a thorough design.**CREATE**Have students review their designs with their group once they are finished, or possibly the following day. Check to ensure the plan is something that is not only buildable, but also represents a structure that would provide shade. With their plan, give students an opportunity to explore the materials provided that would work for their design. Make sure to limit students to a certain amount of materials and time to ensure the entire class has access to the same materials. Make suggestions based on the plan for students to find materials that will work for their intended purpose. The students should compare the different designs with each other. Using Carousel Feedback (<https://www.kaganonline.com/>), they should pick a design they think would be the most successful in providing shade for the ice cube. Once students have their supplies, they can work on their prototypes. The prototype should closely resemble the chosen design, with adjustments being made as needed. Explain that scientists often make mistakes; and it is only in these mistakes that they can learn and grow. Have students take the structures outside. Each team should receive a bag with once ice cube inside. Place one bag with an ice cube out in the open (the “control” ice.) The students each put their bags under their structures. Wait for the control cube to melt. When the control cube is melted, the test is finished. Check the cubes in the structures to see if there is any of the ice cube left. As a class, rank the structures for effectiveness based on the size of the ice cube. After structures are ranked, move back inside for discussion.Optional: Give the ice cubes 5 minutes to melt. Compare the control ice cube with the ones under the structures.**IMPROVE**Place the structures on a table with most effective to least effective. Have the students identify the characteristics of the more effective structures. Ask the students:* What things helped the structures protect the ice cube?
* What things were missing from the structures that did not protect the ice cube as well?
* Did the color of paper used make a difference?

At this time, materials can be added or taken away. Ask the students: if they had different materials, what else would be added or taken away from the design? How would you make it better? Students can also compare their designs to other students’ designs in the room. Students can then RallyCoach (<https://www.kaganonline.com/>) with another student to see if there are improvements that can be made in their original design, including in their drawing. |
| **Enrichment** | Discuss: Living things all need sun to survive. But what about plants? What would happen if a plant had too much sun? Give students a chance to discuss. The sun provides energy for the plants to grow. Some plants need more sun than others. Plants cannot get too much light, but they can get too much of the heat energy that comes with the light. The processes that make food for the plant will shut down if the temperature gets too high, since all the water is being used to cool the plant down.  |
| **Closure** | Review why different structures may have worked better than others, including how the black paper may have absorbed more heat than the white paper, since white reflects the wavelengths of light and absorbs less heat.  |
| **Assessment** | Summative: See rubric |

Differentiated Instruction

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| **Below Grade Level** | **On Grade Level** | **Above Grade Level** |
| Discuss how a structure could reduce the warming effect of the sunlight on an area and provide shade. Student may require assistance in writing and can be paired up with a student at a higher level.  | Discuss how a structure could reduce the warming effect of the sunlight on an area and provide shade. Student may be able to work more independently with teacher support. | Discuss how a structure could reduce the warming effect of the sunlight on an area and provide shade. Student may be able to work completely independently, as well as being paired with a student of a lower ability level. |
| **ELL Strategies** |
| *Visual Aids:* Show the student pictures of the different vocabulary words described in the lesson, and/or have the student discuss different types of structures to reduce the warming effect of sunlight.*Hands-On*: Using realia (objects and material from everyday life,) give the student a chance to explore different types of structures to reduce the warming effect of sunlight. Repeat the different examples and check for understanding. *Word Wall:* Post new vocabulary terms on the wall with similar terms near each other for easy reference. The flash cards with picture of the words can be incorporated into this strategy, or the student can add it in a notebook. Make sure the student draws their own pictures rather than relying on something drawn for them. |
| **DOK Question (Level 3)** |
| Ask students: How would you test if your structure would work for a long time? What about when the sun is in a different position in the sky? |

Kindergarten Rubric: Engineering

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| **Criteria** | **Exceeds Expectations - 3** | **Meets Expectations - 2** | **Below Expectations - 1** |
| K-PS3-2: Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. | Student used materials appropriately. | Student used some materials appropriately. | Student did not use materials appropriately. |
| K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. | Student participated with group members to create the model. | Student sometimes participated with group members to create the model. | Student did not participate with group members to create the model. |
| K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. | Student completed the assigned blueprint, including labeling the components. | Student partially completed the assigned blueprint and labeled some components. | Student did not complete the assigned blueprint and did not label the components. |
| K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. | Students compared at least two other designs to their own to make improvements. | Students compared one other design to their own to make improvements. | Students did not compare their design to another. |
| SL.K.1a: Followed agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about topics and texts under discussion.) | Student fully participated in class discussions. | Student somewhat participated in class discussions. | Student did not participate in class discussions. |
| Instructions | Student followed all instructions. | Student followed some instructions. | Student did not follow instructions. |
| Completion | Student completed plan and model. | Student completed some of the plan and/or some of the model. | Student did not complete the plan and/or the model. |
| Effort | Student used best effort and perseverance on the shade structure. | Student used some effort and perseverance on the shade structure. | Student did not show effort or perseverance on the shade structure. |

Points: \_\_\_\_\_\_ / \_\_\_\_\_\_\_= \_\_\_\_\_\_\_\_%

Comments:

Videos and Websites

Merriam-Webster’s Learner’s Dictionary: <http://learnersdictionary.com/>

Kagan online: <https://www.kaganonline.com/> myON: <https://www.myon.com/>

Merriam-Webster Word Central: [www.wordcentral.com](http://www.wordcentral.com)

 “What’s The Weather Like Today/Song Lyrics Video for Kids/The Kiboomers” (2:05): <https://www.youtube.com/watch?v=KUSbazn3STo>

“Sesame Street – Weather” (6:19): <https://www.youtube.com/watch?v=d18lzD2GCks>

“Classic Sesame Street – Grover tries to sell Kermit a Weather Machine” (2:46): <https://www.youtube.com/watch?v=rV8GGMXBgKE>

The Cat in the Hat Knows a Lot About That: “Weather Transformer”: <http://pbskids.org/catinthehat/games/weather-transformer>

Sid the Science Kid: “Weather Wheel”: <http://pbskids.org/sid/weatherwheel.html>

Everyday Science for Preschoolers: “Dress for the Season”: <https://vegas.pbslearningmedia.org/resource/evscps.sci.ess.watcyc.dress/dress-for-the-weather/#.Wpbz26inGUk>

EduPlace/ Houghton Mifflin Company: “Discover! Looking at the Sky”: <http://www.eduplace.com/kids/hmsc/activities/simulations/grk/unitd.html>

“Check out the weather! (a weather song for kids)” (2:42): <https://www.youtube.com/watch?v=RmSKsyJ15yg>

“Kid Meteorologist” (1:28): <https://www.youtube.com/watch?v=PvZv3D8SKUA&t=10s>

 “The Thermometer Song (song for kids about temperature)” (1:58): <https://www.youtube.com/watch?v=Vk6rP_4wpvk>

BrainPOP jr.: “Temperature” (4:46): <https://jr.brainpop.com/math/measurement/temperature/>

PBS Parents - DIY Bottle Thermometer: <http://www.pbs.org/parents/adventures-in-learning/2014/09/diy-bottle-thermometer/>

PBS Kids: Sid the Science Kid: “Weather Surprise” <http://pbskids.org/sid/fablab_weathersurprise.html>

Math is Fun: “The Interactive Thermometer” <https://www.mathsisfun.com/measure/thermometer.html>

“Sesame Street Windy with Alison Bartlett O’Reilly Video” (5:29): <https://www.youtube.com/watch?v=36XwSbM8stQ>

“Wind direction and speed” (2:09): <https://www.youtube.com/watch?v=SqbTrbxWT1o>

Education.com: How to Make a Wind Vane: <https://www.education.com/activity/article/wind_vane_first/>

“Winds In The East Mary Poppins 1964” (0:25): <https://www.youtube.com/watch?v=SSfGBskfthg>

“How Does A Weathervane Work” (1:15): <https://www.youtube.com/watch?v=CvG2vwrNsdE>

BBC Home: “Wind Direction:” <http://www.bbc.co.uk/schools/whatisweather/aboutweather/winddir.shtml>

BBC Home: “Wind Force:” <http://www.bbc.co.uk/schools/whatisweather/aboutweather/windforce.shtml>

“Sesame Street animation – the cat who hated rain” (1:31): <https://www.youtube.com/watch?v=Y3TMYXzXrDQ>

“Classic Sesame Street – Ernie over-prepares for rain” (3:04): <https://www.youtube.com/watch?v=tZhKem-fG3k>

Science Kids: Rain Gauge Project: <http://www.sciencekids.co.nz/projects/raingauge.html>

“Learn How to Measure Rainfall” (4:43): <https://www.youtube.com/watch?v=WyMabcRzUcw>

Happy Clicks: Collecting Raindrops!: <http://www.happyclicks.net/free_online_games_toddlers/toddlers_game_raindrops.php>

“Weather Song Video” (3:35): <https://www.youtube.com/watch?v=e5UTaPV-DIg>

“Severe Weather: Crash Course Kids #28.2” (4:25): <https://www.youtube.com/watch?v=QVZExLO0MWA>

“Weather 101 for kids – with Meteorologist JD Rudd” (5:33): <https://www.youtube.com/watch?v=qWWx3reC9qA>

“Severe Weather: FEMA” (7:22): <https://www.youtube.com/watch?v=kXw1feTnkU4&t=377s>

“How a Weather Forecast is Made” (2:47): <https://www.youtube.com/watch?v=I_mvYJlypfo&t=4s>

“What Causes Thunder and Lightning?” (3:37): <https://www.youtube.com/watch?v=fEiVi9TB_RQ>

“Thunder and Lightning Explained for Kids!” (10:00): <https://www.youtube.com/watch?v=mCJPQ9dCUfs&t=3s>

Make a rain cloud in a jar: <https://www.giftofcuriosity.com/make-a-rain-cloud-in-a-jar/>

Super Sparker: <https://www.exploratorium.edu/science_explorer/sparker.html>

“What’s a Hurricane?” (4:09): <https://www.youtube.com/watch?v=xKubdY2mHXc>

“Hurricane Facts for Kids!” (11:51): <https://www.youtube.com/watch?v=2kLwbb0ggFU>

Make a Hurricane in a Bowl: <http://experimentexchange.com/earth-space/make-a-hurricane-in-a-bowl/>

Ocean Today – “Hurricane Hunters” (2:14): <https://oceantoday.noaa.gov/hurricanehunters/>

“What is a Tornado?” (3:46): <https://www.youtube.com/watch?v=-s3UwOq1P1E>

“Tornado Facts for Kids!” (8:53): <https://www.youtube.com/watch?v=vH4YT9secVw>

“The 7-Year-Old Storm Chaser” (3:13): <https://www.youtube.com/watch?v=bKS1vasg-L8>

PBS Kids – “Don’t Flood The Fidgits!” - <http://pbskids.org/designsquad/games/dont_flood/>

PBS Kids – “Between the Lions: Flood” - <http://pbskids.org/island/preview/gamepreview.html?btl-flood>

“FLOODS – The Dr. Bionics Show/Best Learning Videos For Kids/Peekaboo Kidz” (3:47): <https://www.youtube.com/watch?v=9hQZCiZ21fk>

BrainPOP: “Floods” (3:02): <https://www.brainpop.com/science/earthsystem/floods/>

“Floods explained” (1:51): <https://www.youtube.com/watch?v=qLvLFdy6lVI>

“How to protect your property from flooding” (2:03): <https://www.youtube.com/watch?v=hDAvZB8vcAc>

PBS Kids – “Don’t Flood The Fidgits!” - <http://pbskids.org/designsquad/games/dont_flood/>

PBS Kids – “Between the Lions: Flood” - <http://pbskids.org/island/preview/gamepreview.html?btl-flood>

“Sesame Street: Grover Weather Monster” (2:37): <https://www.youtube.com/watch?v=tmO9cjsj1zc&t=5s>

The Weather Channel: <https://weather.com/> MeteoEarth: <http://www.meteoearth.com/>

Sid the Science Kid weather wheel: <http://pbskids.org/sid/weatherwheel.html>

Cat in the Hat weather: <http://pbskids.org/catinthehat/games/weather-transformer>

BrainPOP jr.: “Seasons” (4:10): <https://jr.brainpop.com/science/weather/seasons/>

“Time: ‘Four Seasons,’ The Seasons of the Year by StoryBots” (1:13): <https://www.youtube.com/watch?v=NavWWM2iTEw>

“The Seasons Song: Scratch Garden” (2:59): <https://www.youtube.com/watch?v=H32W-6CKdfk>

“Seasons Song Video” (4:18): <https://www.youtube.com/watch?v=8ZjpI6fgYSY>

“Sesame Street: Eating Cookies All Year With Cookie Monster” (1:57): <https://www.youtube.com/watch?v=1qGdXc2tH3s>

Sheppard Software: “Seasons”: <http://www.sheppardsoftware.com/scienceforkids/seasons/seasons.htm>

TurtleDiary: “Seasons”: <https://www.turtlediary.com/game/seasons.html>

Education.com: “Seasons Suitcase Sort”: <https://www.education.com/game/seasons-suitcase-sort/>

Clifford – “Stickers for All Seasons”: <http://www.scholastic.com/clifford/play/seasonalstickers/stickers-main.swf>

Tvo Kids: “Sticks and Seasons”: <https://tvokids.com/preschool/games/sticks-and-seasons>

PBS Learning Media: “Dress for the Season”: [https://vegas.pbslearningmedia.org/resource/evscps.sci.ess. watcyc.dress/dress-for-the-weather/#.WqGvV-jwaUk](https://vegas.pbslearningmedia.org/resource/evscps.sci.ess.%20watcyc.dress/dress-for-the-weather/#.WqGvV-jwaUk)

BrainPOP jr.: “Spring” (5:05): <https://jr.brainpop.com/science/weather/spring/>

“Spring is Here Song” (1:11): <https://www.youtube.com/watch?v=Qhv29_M-P5Q>

Making a cloud: <http://www.kidspot.com.au/things-to-do/activity-articles/how-to-make-a-cloud-in-a-jar/news-story/ef26a01b9ca11d7f44dd607563125ad1>

“Sesame Street: Spring Is Here” (3:37): <https://www.youtube.com/watch?v=0FD5sIQS_u0>

“Cloud Facts for Kids!” (11:31): <https://www.youtube.com/watch?v=EhLT11hKyok>

PrimaryGames: “Spring Games”: <http://www.primarygames.com/seasons/spring/games.php>

BrainPOP jr.: “Summer” (5:26): <https://jr.brainpop.com/science/weather/summer/>

“FROZEN/”In Summer” Song – Official/Official Disney UK” (1:59): <https://www.youtube.com/watch?v=UFatVn1hP3o>

Science Made Fun! Ice Cream: <http://www.sciencemadefunkids.net/experiments.cfm?Exp=7>

“Summer Song for Kids/The Singing Walrus” (2:31): <https://www.youtube.com/watch?v=mVhh0oATqBI>

PBS Kids: Curious George: “Day at the Beach”: <http://pbskids.org/curiousgeorge/games/day_at_beach/day_at_beach.html>

Primary Games: “Summer Games”: <http://www.primarygames.com/seasons/summer/games.php>

BrainPOP jr.: “Fall” (4:42): <https://jr.brainpop.com/science/weather/fall/>

“Why Do Leaves Change Colors in the Fall?” (3:21): <https://www.youtube.com/watch?v=Xk4-6II8l5Q>

The Preschool Toolbox: Maple Leaf “Color, Scratch, and Reveal”: <https://thepreschooltoolboxblog.com/fall-leaves-change-colors-playfulpreschool/>

Maple Leaf Template: <https://thepreschooltoolboxblog.com/wp-content/uploads/2014/09/Maple-Leaf.pdf>

“Autumn/Fall Video for Kids & Toddlers: Reading” (1:23): <https://www.youtube.com/watch?v=Fk4K1f03DCc>

PrimaryGames: “Fall Games”: <http://www.primarygames.com/seasons/fall/games.php>

BrainPOP jr.: “Winter” (4:57): <https://jr.brainpop.com/science/weather/winter/>

“Where Do Snowflakes Come From?” (3:41): <https://www.youtube.com/watch?v=-M48RfaWcWA>

Growing a Jeweled Rose: Erupting Snow Recipe: <http://www.growingajeweledrose.com/2013/01/erupting-snow-recipe.html>

“Sesame Street Ernie Plays A Guessing Game About Winter Clothes For The Cold Snow” (2:49): <https://www.youtube.com/watch?v=DM853YR-UPU>

PBS Kids: “Happy Holidays”: <http://pbskids.org/holidays/>

PrimaryGames: “Winter Games”: <http://www.primarygames.com/seasons/winter/games.php>

Interactive Sites for Education: “Winter: Snowmen, Snowflakes, and Gingerbread”: <http://interactivesites.weebly.com/winter.html>

Coolmath Games: “Winter Holiday Games”: <https://www.coolmath-games.com/1-winter-holiday-games>

“The Sun Song: Educational Science Video for Kids: Scratch Garden” (2:06): <https://www.youtube.com/watch?v=OBnDKfHtcd0>

“Outer Space: ‘I’m So Hot,’ The Sun Song by StoryBots” (1:59): <https://www.youtube.com/watch?v=t-kzdR93bqw>

BrainPOP jr.: “Sun” (6:13): <https://jr.brainpop.com/science/space/sun/>

“Sesame Street: Kermit’s Weather Calendar” (5:13): <https://www.youtube.com/watch?v=8dAp78XJUsQ&t=18s>

“Be a Weather Watcher” (3”58): <https://www.youtube.com/watch?v=Uo8lbeVVb4M&t=4s>

Weather Report For Kids: <https://kidsweatherreport.com/>

“Cloud Facts for Kids!” (11:31): <https://www.youtube.com/watch?v=EhLT11hKyok>

“What Are Clouds Made Of?” (3:36): <https://www.youtube.com/watch?v=DigBbR3FeP8>

BBC Home: “What is weather? Clouds”: <http://www.bbc.co.uk/schools/whatisweather/aboutweather/cloud.shtml>

Kids’ Emergency Preparedness Activity Guide: <https://www.smgov.net/uploadedFiles/Departments/OEM/Preparedness/KidsActivityGuide.pdf>

Ready.gov: “Be a Hero…and Build a Kit!”: <https://www.ready.gov/kids/games/data/bak-english/index.html>

Disaster Hero: <http://www.disasterhero.com/>

“’Stay Safe in the Sun’ Song: Doc McStuffins: Disney Junior” (1:44): <https://www.youtube.com/watch?v=4H6P_n3k6xc>.

SciJinks: Tornado Simulator: <https://scijinks.gov/tornado-simulation/>

Software Applications (Apps)

“School Bell Weather – Weather for Kids” – Ladeez First Media

“MarcoPolo Weather” – The Weather Learning Game

“Freddy the Frogcaster’s Weather Station” – Nine 22 Media, LLC

 “Weather Duck” – Hendri Soerianto

“Weather Puzzles for Toddlers and Preschool” – Scott Adelman Apps Inc

“Digital Thermometer app” – Current temperature&humidity

“Wind Compass” – Anapa Apps

“Rain Sleep Sounds” – Relax & Sleep Better

“Rain Sound Central” – Mike Napoli

“Weather Alert Map USA” – Severe Weather & Storm Tracks

“Thunderstorm Sounds Nature – Thunderstorm” – Javed Khan Pathan

“My Lightning Tracker & Alerts” – Live Lightning Map & Tracker

“Volt – 3D Lightning” – Unleashed From Your Fingertips

“NOAA Now” – Weather from NOAA

 “My Hurricane Tracker & Alerts” – Hurricane and Tornado Tracker

“Wind Map: 3D Hurricane Tracker” – Hurricanes, Typhoons & Cyclones

“FloodWatch” – D5G Technology, LLC

“Flood: American Red Cross” – American Red Cross.

“Tornado Alley.” – Darin Edmonds

“The Four Seasons – An Earth Day Interactive Book” – TabTale LTD

“Kid Season Learning – Toddlers” – Appricot Studio

“Natural Seasons by BabyBus” – BABYBUS

“Spring Wallpaper – Nature Wallpaper” – Gunvata Patel

“Jiggy For Scenic Fall Leaves” – StudentShortcuts Inc.

“DIY Sun Science” – The Lawrence Hall of Science

“Sundial – Solar & Lunar Times” – With custom alerts

“Weather 15 Days” – Tutiempo Network S.L.

“MyWeather – 10-Day Forecast” – Notification, Widgets & Themes

“Field Guide to Clouds” – University Corporation for Atmospheric Research

“SSEC-ISEE/JPSS” – UW-Madison SSEC

“Aware & Prepare” – Indian River Company