

Background Information:

December through February comprise the winter season in the Northern hemisphere. Changes in temperatures, forms of precipitation, types of storms, and preparedness plans occur during winter. Average daily temperatures in the Chicago area range from a high of 36°F to 18°F as a low, while precipitation ranges from 1.93 inches to 2.56 inches. These are average conditions for the winter season.

Freezing rain may accumulate making walking and driving difficult. Trees and power lines may fall due to the weight of the ice. Snow, caused by water vapor freezing in the air, may have similar consequences as freezing rain. When visibility is extremely limited due to blowing snow the event is classified as a blizzard. One health concern during the winter season includes dry skin due to evaporation of water from the skin. Due to the amount of time indoors, immune systems may be compromised. Frostbite may happen within a few minutes of skin exposure to extreme cold. Due to slippery conditions, such as ice, injuries from falls may increase. Those susceptible to respiratory conditions may experience difficulties due to the temperatures. Weather forecasting, storm advisories, snow/ice removal, and dressing appropriately for the weather aid in preparedness for the effects of winter.

In addition to humans, other animals as well as plants may be affected by winter. Many survival techniques enable the organisms to survive this season. Hibernation is a survival technique for some animals. Body systems, such as respiration and heart rate, are slowed and body temperature is lowered until conditions are supportive of coming out of hibernation. Other strategies for winter survival include dormancy, living at the bottom of a body of water, burrowing into the ground, migrating, and changing of body coloring to blend in with the snowy landscape. Other animals may change colors to better blend in with the winter landscapes. Shorter amounts of sunlight affect photosynthesis. Growth is slowed. Freezing temperatures cause both the accessible water and the water inside plants to freeze. Some plants go dormant, while others appear to die. Plants that die have often dropped seeds so when optimum conditions are reached in another season new plants will grow. While other plants, such as tulips, also have their above ground structures die, their below the soil surface bulbs provide nutrients needed to survive until the next growing season. <http://planthardiness.ars.usda.gov/PHZMWeb/> maps the hardiness zones for plants.

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Both plants and animals are dependent upon their environments for survival. However, in order to get the sustenance they need, organisms often must alter their environment to meet their needs. Some animals gather and store food for a season due to times of extreme temperatures, ground conditions, and availability. Many bury food in the ground, while others store food in plants. Usually, the limbs or hollowed out sections of the trunks of trees are used, though some animals do store their food in densely populated areas of low plants. <http://www.discoverwildlife.com/british-wildlife/how-identify-animal-food-stores> provides a detailed list of some animal actions, while images of and facts about animals may be found at <http://www.nationalgeographic.com/animals/index/> and <http://www.pbs.org/wnet/nature/the-animal-house-introduction/7194/>.

In addition to bodies of water such as streams, lakes, ponds, and precipitation collection areas, leaves are a source of water for animals. Plant roots grow toward a water source, such as a low lying area where water can pool. Roots are also capable of pushing through concrete and other obstacles to get nutrients and water.

Animals, such as humans, also alter the environment for their survival. Prior to a home being built, ground needs to be prepared, whether it is leveling, digging, or removing plant life. Some animals build homes from leaves and other flora. Shells are used by others.

Shoveling snow and sledding often are winter activities in the Midwest. Both require a force to occur. Pushing or pulling on the item will have different effects on the movement of that item. In the case of sledding, a greater force may result in a faster speed or a greater distance covered by the sled. Applying a force in a different direction may result in a change of direction of the object. Shoveling is more successful when the shovel is pushed rather than pulled.

Winter Read Aloud Suggestions:

When It Starts to Snow by Phillis Gushator

Over and Under the Snow by Kate Messner

Animals in Winter by Henrietta Bancroft and Richard G. VanGelden

Owl Moon by Jane Yolen

Waiting for Winter by Sebastian Meschenmoser

Snowy Day by Ezra Jack Keats

The Mitten by Jan Brett

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Activity: Daily Local Weather Recording

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K-ESS2-1 Earth's Systems

Use and share observations of local weather conditions to describe patterns over time.

Objectives:

- Students will record daily weather, which includes sunny, cloudy, precipitation, and relative temperature.
- Students will tally the number of days for each type of weather.
- Students will use collected data to determine and predict weather patterns.

Advanced Preparation:

- Determine how the class will collect the data to chart. Will this be part of the beginning of each day?

Materials:

- *My Weekly Weather Chart* Student Page
- *Monthly Weather Chart* Student Page
- Teacher Set of Weather Symbols
- Teacher Set of Numbers
- Pocket Chart (optional)
- Coloring Supplies (optional)
- Glue Stick (optional)
- Sight Words (optional)

Note: You may wish to have sight words available for pasting into, “The weather this week was,” portion of the My Weekly Weather Chart Student Page.

Suggested Approach:

Each student will have their own weather chart. Continue to use the weekly weather chart to collect and record daily weather data, as well as discuss observations. At the end of the each week and each month, analyze data looking for patterns.

Debrief:

The following prompts may be helpful for weather discussions. Encourage students to justify their decisions.

- ☑ *What type of weather did we have this week?*

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- Was the weather the same each day? Use your weather chart to help make your decision.
- Was the weather different each day?
- What do you think the weather will be (tomorrow, next week)? Why do you think this?

Activity: What's the Weather?

K-ESS3-2 Earth and Human Activity

Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.

Objectives:

- Students will work collaboratively to research information needed to develop a forecast.
- Students will present forecasts to the class.
- Students will develop an understanding of the importance of forecasting.

Advanced Preparation:

- Determine the size of the forecast group. Individual? Groups of 2? 3? 4?
- Determine the frequency of forecasts.
- Decide the presentation format.

Materials:

- *What's the Weather* Student Page
- Newspaper Forecasts (optional)
- Computer with Internet Access (optional)

Suggested Approach:

Continue with student forecasts. A forecast is to make a prediction, something often done in science. Analyzing patterns seen in daily weather, as well as over the years, is used to make forecasts. Students should refer back to their daily weather data in developing their forecasts.

Assist students as needed as they complete their forecast notes on the *What's the Weather* student page. You may wish to have students do some research to help them prepare their forecasts. Some websites for students include

<https://kidsweatherreport.com/>,

<https://weather.com/weather/tenday/l/Kids+Place+A9704258:17:US>, and

<https://www.weather.gov/cae/justforkids.html>. Using the following prompts may help students to connect the usefulness of forecasting:

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- ☆ *Will you wear a thick coat or just a jacket?*
- ☆ *Will you have to cover exposed skin (hat, gloves, and scarf)?*
- ☆ *Will you need thick boots? Waterproof boots? Boots with a good tread?*
- ☆ *Will it be too slippery to go down the front steps without holding the railing?*
- ☆ *Is it safe to wait for the bus in the same place/manner that you usually do?*
- ☆ *Can you walk your normal path to school or will there be obstacles to go around?*
- ☆ *Is the snow very deep?*
- ☆ *Why is it important to know what the winter weather will be?*

Note: Change the above questions as needed to reflect each season.

Upon completion of their forecasts, student groups present their work to the class.

Activity: Animal Coat Change

K-LS1-1 From Molecules to Organisms: Structures and Processes

Use observations to describe patterns of what plants and animals (including humans) need to survive.

Objectives:

- Students will make observations of organisms at various times of the year.
- Students will identify needs of living organisms to survive.
- Students will identify and discuss challenges of obtaining food and water in winter.

Materials:

- Animal Coat Change Cards – 1 Set per Group of 4

Suggested Approach:

Begin a class discussion with questions such as the following:

- ☆ *What do plants and animals need to live? (Note: this would have been covered in previous summer/fall lessons.)*
- ☆ *During the winter in Illinois, where would plants and animals get what they need to live?*
- ☆ *Would finding food, and water be easier or harder during the winter in Illinois? Why do think so?*

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Students will work in groups of four to complete this activity. Share directions for the activity with the students.

You and your partners will:

1. *Place all the cards face up on your tables/desks for all to see.*
2. *Look at the animal cards. Share with your group what you notice about the animals. (An alternative is to have each student responsible for one card.)*
3. *Talk about how you would you put the cards into groups.*
4. *Put the pictures into groups.*

Distribute a set of the animal sorting cards to each group of students. Assist groups as needed. (*Note: There may be different groupings. For example, some may put cards into winter and not winter, while others match the two cards for each animal.) You may wish to have students complete a gallery walk to see how other groups classified the cards.

Host a class discussion using questions such as the following:

- ☆ *What did you see in the pictures?*
- ☆ *Was anything different among the pictures? Share what you saw.*
- ☆ *Was anything the same among the pictures? Share what you saw.*
- ☆ *How did you decide what groups to use for sorting the cards?*
- ☆ *Tell us about the way you grouped the animals.*

Next have students return to their groups. This time groups look at the pictures to come up with ideas as to how seasonal color change may help an animal get what it needs in order to live. Assist groups as needed. After students have had sufficient time to develop ideas as a group, hold a class discussion regarding their ideas.

Debrief:

- These pictures were taken at different times of the year. When do you think they were taken?*
- Which ones do you think are from the winter?*
- Why would an animal's fur change colors from one season to another?*
- How might this help an animal survive? Get food?*

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Activity: Time to Eat

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K-LS1-1 From Molecules to Organisms: Structures and Processes

Use observations to describe patterns of what plants and animals (including humans) need to survive.

Materials:

- Animal Food Cards
- Meat Cards
- Plant Cards
- Water Cards
- Attribute Sorting Circles (optional)

Objectives:

- Students will work cooperatively.
- Students will classify organisms as plant eaters, meat eaters, or herbivores.
- Students will all organisms need water.
- Students will justify groupings of cards.

Suggested Approach:

There are many strategies for this lesson based on the characteristics of your students. The object of the card sort is for students to group the cards according to the needs of the organism. For example, a bear needs meat, plants, and water for survival. Once the cards are grouped together, students would explain and justify the relationships among the cards to the rest of their student group.

Possible methods of “playing” the card sort game include the following: Deal the cards among the group members, such as in groups of four. A student places one of their cards in the middle of the table. Another student places a card related to the original card in the center of the table and explains their rationale. This continues until the grouping for this card sort are complete. Student groups would come to consensus on the grouping of cards and move the card set to the side. The process then begins again. The cards may be used in a dominoes style playing method. Placing all cards in the deck face up and using an alternate version of concentration may be appropriate.

Grouping strategies will vary among students. Some groups may put an animal, a water card, and the needed foods in one card set. Other groups may arrange cards as meat eaters, plant eaters, and both. They may add a water to

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this group. If needed, coach groups as to achieve the concept that all organism need water and food to live.

Once students have finished grouping the cards, host a type of sharing session. A gallery walk, regrouping of students, and other methods may be used. Students would then return to their original seats.

An additional strategy would be to use a Venn diagram with attribute sorting circles. <http://www.readwritethink.org/classroom-resources/lesson-plans/introducing-venn-diagram-kindergarten-378.html> contains strategies for teaching kindergarten students how to use Venn diagrams. Possible groups of attributes could be plant, meat, and plant and meat eaters or plants, animals, and water.

Debrief:

- ☆ *How did your group decide what cards went together?*
- ☆ *What types of foods do different animals eat?*
- ☆ *What else do animals need to live?*
- ☆ *What do plants need to live?*
- ☆ *What do both plants and animals need to live?*

Activity: Winter Clothing Challenge

K-2-ETS1-1 Engineering Design

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.

Objectives:

- Students will work collaboratively to follow a procedure.
- Students will carry out an investigation.
- Students will use collected data to make a recommendation.

Advanced Preparation:

- Prepare a set of fabric sample cards.
- Determine how materials will be arranged and distributed for testing.
- Determine how testing will proceed. Will all groups complete the same test simultaneously?
- Determine what will be accomplished each day.
- Water will be needed.
- Paper or cloth towels may be needed for cleaning up spills.

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- Bring in a mitten and glove if you will be using one for discussion. (Check the Lost and Found box for these items.)

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Materials:

- Winter Fun Power Point
- *Winter Clothing Challenge* Student Pages
- Fabric Sample Cards
- 3 Fabric Samples for Each Group
- Cups
- Water
- Droppers
- Coloring Supplies
- Containers for Snow
- Chart Paper (optional)
- Plates
- Towels for Cleanup
- Mitten and Glove (optional)
- Snow, Ice Cubes, Crushed Ice

Suggested Approach:

You may wish to introduce this lesson by sharing the video of children playing outside in the snow. This video can be located at:

https://www.youtube.com/watch?time_continue=5&v=T9t4dyiZCIO

Host a discussion about student observations and thoughts from the video. If needed, use questions such as the following to encourage discussion:

- ☆ *What did you notice in the video?*
- ☆ *What are you wondering about from the video?*

You may wish to capture student ideas on chart paper and refer to them throughout the unit.

Next share the *Winter Fun* power point. As the class progresses through the slides, encourage comments on the activities, how the people are dressed, and why they are dressed in that fashion.

Students will work in groups of four. *Note: You may wish to have a mitten and a glove for display during the lesson. You may also wish to have “snow” available for exploration and testing.* Share that they will decide what material(s) they would use to make mittens (or gloves). This involves determining the desirable traits for mittens (or gloves), exploring the materials, and making a decision (claim) of what to use based on evidence.

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Begin by identifying the problem: Which material(s) would you use to make mittens (or gloves)? Next, move to identifying what qualities a mitten (or glove) needs to have. Each group discusses what a mitten (or glove) needs to have. After they've had time to discuss their group's ideas, elicit ideas from the class. Record the ideas on chart paper.

Introduce the fabric samples to the students. You may wish to label a sample and display it for the students. Another idea is to make sample cards for each fabric type. Attach a small sample of one material to an index card and label that card with the fabric's name. Provide each group with one set of sample cards.

Follow with examination and testing of the materials available. Tests may include, but are not limited to the following:

- ☆ *Observations of material samples with hand lenses*
- ☆ *Flexibility of material samples*
- ☆ *Water repelling*
- ☆ *Water absorption*
- ☆ *Warmth*
- ☆ *Order of layers*
- ☆ *Comfort of material samples*

Distribute student pages one at a time. Assist students in recording their observations and data. Once groups have had time to finish all of the testing, they need to decide what material(s) they would use to make a mitten (or glove) and why. You may wish to have your students record the data and their choices on the student pages if appropriate.

Follow up the investigation with a tally of choices for each material, as well as a pro and con list for each type of material. Here are some questions for discussion: (Go back to the original traits as needed for discussion and prompting thinking.)

Debrief:

- ☆ *If someone asked you what type of mitten to buy, what would you tell them?*
- ☆ *Why would you tell them this?*

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Activity: Which Shovel?

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K-PS2-1 Motion and Stability: Forces and Interactions

Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

K-2-ETS1-1 Engineering Design

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 Engineering Design

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.

Objectives:

- Students will work collaboratively to follow a procedure.
- Students will observe, test, and collect data.
- Students will identify effects of a push and pull on a snow shovel.
- Students will use data to design an improved snow shovel.
- Students will communicate decisions.

Advanced Preparation:

- ❑ “Snow” will be needed. Ice cubes or crushed ice may be used as well.
- ❑ Determine how the materials will be set up around the room.
- ❑ Determine how testing will proceed. Will all groups complete the same test simultaneously?
- ❑ Determine what will be accomplished each day.

Materials:

- *Which Shovel* Student Pages
- Snow Drift Pictures
- “Snow”
- Plastic Containers
- Shovel Sets (3 different “mini-shovels”)
- Coloring Supplies
- Drawing Paper
- Towels for Cleanup

Suggested Approach:

Students will continue their exploration of push and pull, as well as the design process. Distribute a snow drift picture to each group of four students. Groups

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of students should talk about their picture. Encourage students to discuss possible ideas about the following:

- ☆ *What do you see?*
- ☆ *Is there a problem here?*
- ☆ *What might that problem be?*
- ☆ *How might that problem be solved?*
- ☆ *What if you lived in that house?*
- ☆ *What might you need to do to get to your front door?*

Allow time for each group to show their picture to the class and share their ideas. Explain to students that they are going to test some miniature models of shovels to see which they think might be best to use for shoveling snow. *Note: You may wish to use snow if it is available.* Post and discuss the questions to be investigated. Below are some suggestions:

- ☆ *What happens when the shovel is pushed?*
- ☆ *What happens when the shovel is pulled?*
- ☆ *What happens when you use the _____ shovel?*
- ☆ *Was this shovel easy or hard to push? Pull?*
- ☆ *What happens when you use the _____ shovel?*
- ☆ *Was this shovel easy or hard to push? Pull?*
- ☆ *What happens when you use the _____ shovel?*
- ☆ *Was this shovel easy or hard to push? Pull?*

Familiarize students with the materials. Distribute materials to student groups of 2. Assist groups as they work through the testing process. When appropriate, have students record their observations on the Shovel student page.

Pull the class together and discuss what they observed. It is suggested to chart the responses. Ask and elicit student responses to the following. “Based on what was observed, what questions would you want to think about if you were buying a snow shovel?”

You may wish to combine pairs of students into groups of four. Have them design and draw what they think a better shovel would look like based on their investigations. Encourage the use of labels, arrows, and words in the drawings. Groups share their designs and justifications with the class. There are many ways to accomplish this.

Debrief:

- ☆ *What was the same with all the shovels?*
- ☆ *How were the shovels different?*
- ☆ *Why do you think there are lots of different kinds of snow shovels?*

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Activity: Build a Nest

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K-ESS2-2 Earth's Systems

Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Objectives:

- Students will collect and identify textual evidence that identifies ways that animals use natural materials for their needs.
- Students will work collaboratively analyze materials, communicate findings, share ideas, and construct a nest using chosen materials.
- Students will justify their choices for materials used in their nest.
- Students will identify potential sources of nest building materials.

Advanced Preparation:

- Determine how many items students will have available for building the nests. A new material identification card will be needed for each building material.
- Consider how materials will be organized for student use.
 - Will there be stations?
 - Will each group have a set of samples?
 - Is it best to only have one item out for the entire class at one time?
- You will need a different “These are my observations for…” page for each of the observed materials.
- If you decide to have the students “glue” the nests together, paper mache paste may be made from two parts of water to one part of flour. Mix until it is the consistency of pancake batter.

Materials:

- *A Nest is Noisy* by Dianna Hutts Aston
- Material Identification Cards
- Hand Lens
- Suggested Materials:
 - Raffia
 - Moss
 - Yarn, String
 - Cotton Balls

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- Fabric Scraps
- Wooden, Plastic, or Styrofoam Eggs Assorted Sizes (optional)
- Nest Book Student Pages (*Each student will need a different copy of the “These are my observations for...” journal page for each of the items they will observing.*)
- Materials for Binding Books (optional)
- Computer
- Animal Homes Power Point

Begin a class discussion about animal homes by asking students questions such as:

- ☆ *Where do birds live?*
- ☆ *What is a nest?*
- ☆ *Where do birds get the materials they need to make a nest?*
- ☆ *What other animals make a “nest”?*

Share that now you will be reading a book about bird homes. Read *A Nest is Noisy* to the class. Read the book a second time. This time encourage students to observe traits of the nests, such as materials used, sources of the building materials, locations of nests, and sizes.

Introduce the building phase of the lesson. Explain to students that they will be deciding on materials that they think would be good for building a nest. Share the following with the students:

- The eggs that will be used in this model
- They will be designing an idea for a “nest”
- Each material that will be used and material identification cards
- Have the name of the material available

Students need to observe each material and describe it. Use of a hand lens will assist students with this task. Encourage drawings, coloring, and words. You may wish to have students select a type of bird that would use the student created nest. Using your selected strategy from Advanced Preparation, distribute the materials or assign groups to stations. Assist groups as they work through student pages. When students are finished, help them assemble their books.

Book Contents:

- Cover/Title Page (Students make)
- These are my observations... (One page for each of the materials)

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- I would build a nest from... (Drawing and justification for material(s) selected)
- This is what my nest would look like... (Drawing of nest)
- Homes can be made of many things... (Drawing)
- Nests can be made of... (Drawings of other materials and/or sources. Explanation of how the materials may be used. This justification may be a written or verbal explanation by the student.)

Students will complete the following steps:

- Observe the materials and record observations
- Experiment with or test the materials
- Record additional observations
- Build the nest

Debrief:

- What similarities did you see among the nests?*
- What differences did you see among the nests?*
- What other materials do you think an animal could use for making a nest? A home?*
- Where would the animals get this material?*

Resources:

<https://www.usclimatedata.com/climate/illinois/united-states/3183>

<https://www.health.harvard.edu/staying-healthy/how-does-cold-weather-affect-your-health>

<http://www.umm.edu/health/medical/altmed/condition/frostbite>

<http://www.popularmechanics.com/home/tools/reviews/a7468/which-snow-shovel-is-the-best/>

<https://www.nextgenscience.org/sites/default/files/K-2Topic.pdf>

