

Unit

Our Warming Planet and Its Impact on Wildlife

*First-Grade Climate Change Unit Plan by Giuseppe Delisi and Jodie Parisi
Created for TownGreen2025, Summer 2018*



Unit Description

Young scientists will develop concepts related to the issues of temperature, climate, and the atmosphere. They will identify cause-and-effect relationships related to how an animal's behavior, development, and habitat are being impacted by climate change. Young scientists will create a campaign to combat the negative effects climate change is having on wildlife.

Big Question

How is our Earth's changing climate impacting animal life?

Unit Goals

1. Build background knowledge about the difference between climate and weather.
2. Develop an understanding that the Earth is getting warmer.
3. Understand that the excess greenhouse gases added to the atmosphere by humans are the cause of global climate change.
4. Discover how climate change impacts animal species.
5. Construct an explanation for how all living things are being impacted by issues related to climate change and design a solution to the problems being faced by these different species.

Unit Objectives

Students will be able to explain the local seasonal cycle and relate it to local climate patterns.

Students will understand that:

- Atmosphere and climate are related to one another.
- Greenhouse gases are the cause of the Earth's warming.
- The sources of these gases are related to humans.
- Climate shifts impact the development, behavior, and habitats of animal species.

Vocabulary Resource

Vocabulary Cards for Lessons 1–10: <https://drive.google.com/file/d/1qcxUmMixyEQvVaFsnX-BJrkF2Egadr5-/view?usp=sharing>

Lesson #1

Understanding Temperature

Time: 60 Minutes

Materials:

- Enough thermometers for every 2 students to share one
- A teacher-model thermometer
- 2 basins
- Cold and hot water
- Red construction paper 9" x 12"

For Each Student:

- 1 thermometer face template
- 1 4" x 9" sheet of white construction paper (a 9" x 12" sheet cut in thirds)
- A 2" x 9" red construction paper strip
- A 1" x 4" red construction paper strip
- Crayons — purple, blue, green, yellow, orange

Teacher Prep:

Make a copy of the thermometer blackline master (BLM1a, or BLM1b) for every 2. You may choose to copy a Fahrenheit or Celsius thermometer. Cut out the part that represents the glass and bulb on the thermometer blackline master picture.

Cut out one rectangle of white construction paper (4" x 9") and two strips of red construction paper — one 2" x 9" and one 1" x 4" for each student.

Essential Question

How do you describe and measure temperature?

Lesson Objective:

Students will know how to measure temperature with a thermometer and how to describe the temperature. They will be able to measure the temperature of air and water while using words to describe how the temperature feels.

Evaluation/Assessments:

Students will use a model to accurately read and tell the temperature while describing how that temperature feels. Did they find the correct temperature zone on their model thermometers that corresponds to how the temperature feels?

Did they use accurate vocabulary to decide how the temperature feels?

Students will also be able to dress the "Climate Kids" appropriately depending on the temperature outside. Did they dress their Climate Kids appropriately for the temperature of the weather outside?

Anticipated Challenges/Supports:

Challenges	Supports
For Students: Challenges while making or using the thermometer. Ability to read the thermometer accurately.	https://www.mathsisfun.com/measure/thermometer.html (This online Interactive thermometer reads the temperature and displays a picture that describes how the temperature feels.)
For Students: Challenges while creating clothes for Climate Kids project.	Can use magazine cut-outs of clothing.
For Teachers: A teacher- model thermometer may not be readily available.	Teacher can enlarge the BLM1a or BLM1b and create a demonstration thermometer that matches the students' model thermometers.

Standard(s):

1-ESS1-2. Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, seasonal temperature and rainfall or snowfall patterns, and seasonal changes to the environment.

Vocabulary:

Academic	Descriptive
Temperature Thermometer Degrees Fahrenheit Celsius Basin Meteorologist	Hot Warm Cool Cold Freezing

Lesson Steps/Procedure:

1. Students are introduced to the "Climate Kids." They are 2 students who will follow the class throughout the various lessons within this unit.
2. The Climate Kids need help getting ready to play outside.
3. The teacher will instruct students that we need to know how it feels outside to help them dress appropriately.
4. In order to know how it feels outside, we need to know the temperature.
5. Temperature is measured by using a thermometer. Students will be introduced to a thermometer at this point.
6. Introduction of a thermometer:
 - A. Guided discovery of the thermometer
 - B. The teacher points out the middle tube that contains liquid and a bulb
 - C. Notice the number line that measures degrees
 - D. Degrees are measured in either Fahrenheit or Celsius
 - E. Show students the different zones on a thermometer
 - F. Students will create their own paper thermometer models (BLM1a or BLM1b):
 - Begin by coloring in the hot (orange), warm (yellow), cool (green), cold (blue), and freezing (purple) zones on the left side of the thermometer.
 - Spread glue ONLY along the back long edges of the thermometer picture (do not glue the short edges).

- The red strip will need to move easily through the middle area to show different temperatures on the model thermometer.
 - Glue the thermometer picture to the white construction paper.
 - For the “red line,” glue the small strip of red construction paper across one short end of the end of the longer strip, making a “T” shape.
 - Fit the long strip between the thermometer picture and the white construction paper so the red paper can be seen through the cut out window.
7. Teacher prepares 2 basins (one with cold water and one with hot water)
 8. Teacher poses the question, “How can we tell which basin has warmer water in it without touching the water?”
 9. Students will make a prediction as to how they would approach this challenge.
 10. Put out labeled basins at every table (Basin A = warmer than Basin B).
 11. Students measure the water temperature (with the thermometers they were given to explore at the beginning of the lesson) to see which basin is warmer.
 12. Come back as a group and discuss findings.
 13. Pose the big question, “How can we tell the Climate Kids how to dress for the weather outside today”?
 14. Students will develop a plan and design an investigation to help the Climate Kids. (They will use a thermometer to measure the temperature outside).
 15. Students will then design an outfit (draw it on the Climate Kids cutouts BLM2) for the Climate Kids, based on their knowledge of how to dress according to the temperature zones.

Notes:

For UDL — Allow students to use a variety of materials when designing the Climate Kids. Possible magazine cutouts from clothing catalogues or other tools for drawing, coloring, and decorating outfits for the Climate Kids.

Resources:

BLM 1a or 1b — Fahrenheit or Celsius Thermometer Face Template <https://drive.google.com/file/d/0Bw9fk0hup-apaU5jNfNfQWFfbIQ4NmVheGdZZ3BwRnBCWk80/view?usp=sharing>

BLM2 — Climate Kids Cut Out

<https://drive.google.com/file/d/0Bw9fk0hup-apRTNfU01rcHUyM3owZ2RCYTRuRWpJb1J0NFjr/view?usp=sharing>

A great video to use is “The Thermometer Song” (a song for kids about temperature) by Harry Kindergarten Music, found on youtube.com. https://www.youtube.com/watch?v=Vk6rP_4wpvk

Lesson #2

States of Matter

Time: 30-45 minutes

Materials:

- One 16-oz. glass jar per group of students (Mason or Ball type works best)
- A clear basin deep enough for a 16-oz. glass jar to be completely submerged.
- Water
- A roll of paper towels
- Anchor chart that will eventually include the 3 states of matter
- Markers

Teacher Prep:

Make an anchor chart that has 3 columns labeled Solid, Liquid, Gas

Essential Question:

What are the 3 states of matter?

Lesson Objective:

Students will understand that although air is invisible, it is still around us at all times taking up space.

Evaluation/Assessments:

Use the guiding questions in step 16 to conduct a formative assessment of how students are understanding air. Having students record their understanding after the investigation is also a good way to monitor their understandings.

Anticipated Challenges/Supports:

Challenges	Supports
For Students: Seeing that the jar is filled with air under water can be difficult.	Teacher may want to provide a ping pong ball to highlight the waterline when the jar is submerged.

Standard(s):*

This lesson actually covers standards from Kindergarten standards but is essential in providing background knowledge to continue with our Climate Change Unit.

K-PSS1-1 — (MA) Investigate and communicate the idea that different kinds of materials can be solid or liquid depending on temperature.

- Only a qualitative description of temperature, such as hot, warm, and cool is expected.

Vocabulary

Academic	Descriptive
Solid Liquid Gas Submerge	Invisible Rigid Hard Soft Flexible Smooth Clear Air Water Glass

Lesson Steps/Procedure:

1. Present an empty glass jar to each table of students.
2. Have students observe and describe the jar.
3. Share out each table's observations.
4. Direct students' attention to the color, flexibility, hardness, and texture of the jar. Identify the glass as a solid.
5. Refer to the anchor chart and put the word "jar" under the "solid" column. Record student observations of the jar.
6. Pour water into each jar, filling about halfway.
7. Have students observe and describe the water inside the jar. Ask them to compare the jar and the water. How are they the same? How are they different?
8. Refer to the anchor chart and put the word "water" under the "liquid" column. Record student observations of the water.
9. Have students pour water into a large clear basin. Fill the basin with water so that a jar can be completely submerged.
10. Students will now observe their "empty" jars and you pose the challenge question: What is in the jar now?
11. Students describe what they see (or do not see) in the jar. Students will realize that they are actually observing something called "air" inside of the jar.
12. Refer to the anchor chart and put the word "air" under the "gas" column.
13. Review the anchor chart and give definitions of the 3 states of matter.
14. Pose the challenge, "What will happen to a paper towel in this jar, if I submerge it upside down into this basin of water?"
15. Allow time for students to predict what they think will happen.
16. Demonstrate how you can keep the paper towel dry by putting it under the jar while you submerge the jar upside down into the water, which will trap air (a gas) and keep the paper towel dry. Have each group of students visit the large basin to make closer observations and/or try it themselves.
 - A. This is a great assessment opportunity to ask students:
 - What is in the jar? (Paper towel, air)
 - Why doesn't the water fill the jar? (The air is taking up space)
 - Why didn't the paper towel get wet? (The captured air did not allow water into the jar)
17. Ask for students to explain why and how the paper towel stayed dry. You may make ask for an oral or written response to this question.

■ Notes:

Make sure that jar does not tip while pulling it out of the basin. Do not allow air to escape as you lower and raise the jar in the water.

■ Resources:

N/A

Lesson #3

Atmosphere: The Blanket Around the Earth

Time: 30 Minutes

Materials:

Cotton balls

Cold water with ice

Basin

Plastic bag (1 quart size)

Essential Question:

What's up there? (as teacher points to the sky)

Lesson Objective:

To help students understand that the atmosphere is made up of gases, which help insulate the Earth and keep it warm.

Evaluation/Assessments:

The teacher should use guiding questions during step 13 to assess students' understanding of what it means to be insulated:

What is keeping your hand warm under the cold water? Why?

Step 16 (below) also provides an opportunity for students to express their understanding orally or in written form.

Anticipated Challenges/Supports:

Challenges	Supports
For students: The video is heavy on written language and moves quickly.	Teacher may want to read the captions, stopping the video for questions and answers. Some great digital tools to use for making the video more accessible are edpuzzle (https://edpuzzle.com/), screen castify (www.screencastify.com), and flip grid (https://flipgrid.com/).

Standard(s):

1-ESS1-2: Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, seasonal temperature, rainfall or snowfall patterns, and seasonal changes to the environment.

Science Practice 2. Developing and Using Models

Vocabulary:

Academic	Descriptive
Atmosphere	Warm
Layer	Cold
Clouds	Earth
Wind	Cotton
Insulate, insulation	Fluffy
Ozone layer	Soft

Lesson Steps/Procedure:

1. Reiterate that air is made up of gas; it is invisible, all around us, and takes up space.
2. Draw students' attention to looking outside the school and realizing that there is a lot of air outside.
3. Define atmosphere — different layers of air around the Earth keeping it insulated. Also take this time to review the following vocabulary before watching the video — layer, clouds, wind, ozone layer.
4. Show the youtube video “Introduction to Our Atmosphere” by Frank Gregorio. <https://www.youtube.com/watch?v=I6jIMkPwahQ>. A teacher will need to read the captions as the video plays.
5. Explain that insulation is something that traps heat and keeps things warmer.
6. Tell class that today we are going to complete an activity that will show how the atmosphere insulates the Earth to keep it warm.
7. Pour cold water into the basin; add some ice so students see that the water is very cold.
8. Invite students to come up and put their hands into the water to feel how cold it is. Explain that this water is going to represent space.
9. Propose the question: “How can you keep your hands warm under water?”
10. Have a discussion about what students think can keep them warm under water.
11. Show the class a bag filled with cotton balls.
12. Pass out a cotton ball to each student so they can feel, explore, and describe the cotton ball. Students may make the connection that there is cotton in clothing and that clothing keeps them warm (insulated). They may also note that the cotton ball is light, fluffy, and filled with air.
13. Invite students to come up and put their hands into the bag filled with cotton balls and then submerge the bag into the cold water.
14. Discuss how it feels different and ask them why, and what is happening?
15. Be sure to reiterate the fact that the cotton ball and the air within it act like insulation, trapping the heat to protect our hands from the cold water, just as the atmosphere does for the Earth.
16. Provide opportunities for students to notebook their discoveries — possibly writing about or drawing a picture of the atmosphere and how it relates to the Earth.

Notes:

Students may wrongly believe that the cotton balls represent clouds and that clouds are the insulation or that clouds are made of cotton. Teachers should feel free to review what clouds are (condensed water vapor) and to make it clear that they play a part in insulating the Earth.

Resources:

A great UDL (Universal Design for Learning) feature would be to annotate the video for step 4 using edpuzzle (<https://edpuzzle.com/>), screen castify (www.screencastify.com), or Flipgrid (<https://flipgrid.com/>).

Lesson #4

Understanding Climate

Time: 45 minutes

Materials:

- The book “A Tree For All Seasons” by Robin Bernard
- Anchor Chart
- Markers
- Temperature graphs (BLM3a or BLM3b), 2 copies

Teacher Prep:

Create a temperature graph (BLM3a or BLM3b)

Essential Question:

What is Climate?

Lesson Objective:

Students will understand how Weather and Climate are different but related.

Evaluation/Assessments:

Step 6 and 10 allow for a quick assessment of students’ understanding of seasonal temperature patterns.

Anticipated Challenges/Supports:

Challenges	Supports
For Students: Some students may have difficulty reading and understanding data.	Use manipulatives (such as connecting cubes) to provide a concrete tool/visual representation that will help them understand the data represented on the graph.
Confusion between the seasons.	The literature piece “A Tree for All Seasons” will help students see each season and realize that the seasons follow a predictable pattern.

Standard(s):

1-ESS1-2: Analyze the data provided to identify relationships among seasonal patterns of change, including relative changes in the times of sunrise and sunset, seasonal temperature, and rainfall or snowfall patterns, and seasonal changes to the environment.

Science Practice 4. Analyzing and Interpreting Data

Vocabulary:

Academic	Descriptive
Climate Weather Seasons Graphs Data	Winter Spring Summer Fall

Lesson Steps/Procedure:

1. Introduce the lesson by discussing the seasons. The teacher could touch upon the fact that not all parts of the world have 4 seasons, but that we are going to focus on the seasons in Massachusetts. If you are using this lesson in other states, you can describe the seasons to better fit your area.
2. Read the book “A Tree For All Seasons” by Robin Bernard.
3. Have a discussion about what type of weather we experience in each season.
4. Gather ideas on an anchor chart and refer back to temperature zones from lesson 1. When (in what season) do we have hot, warm, cool, cold, freezing days?
5. Present the two temperature graphs (using BLM3a or BLM3b for both) where you have recorded your local temperature* from the months of January (graph A) and July (graph B). * See teacher notes for more information on finding local historic temperature records.
6. Have students make a prediction about which graph belongs to which season and how they know this? * UDL application opportunity to use a google form*
7. Discuss how students predicted the temperature and how this relates to climate.
8. Bring in Climate Kids here to explain the difference between weather and climate. Use a probing question, such as “Do you think the clothes you made previously for the Climate Kids will be appropriate for today’s weather?” “Will their clothes be appropriate for weather in _____ season?”
9. Define weather and climate* (See teacher notes).
10. Discuss that we expect it to be cold in the winter and hot in the summer. Ask students for examples of what type of clothing they would wear and what activities they would take part in in January and then again what they would wear and do in July. Put ideas on an anchor chart divided into 2 columns labeled January/ July and 2 rows titled clothing/activities.

Notes:

Students will have to know how to read a graph and data.

In order to gather temperature data for the months of January and July in your area, we suggest using a weather app similar to www.wunderground.com. This weather app allows you to look back at historical weather and recorded temperature data.

Background information for Teachers:

climatekids.nasa.gov has great information on this topic.

The difference between weather and climate is that climate is the big picture, while weather happens at a particular time and place and is local and temporary.

“Climate” describes conditions over the long term and over an entire region.

It is the big picture of temperatures, rainfall, wind, and other conditions over a larger region and a longer time than weather.

If students really enjoyed the first Climate Kids activity of dressing their Climate Kids, then feel free to assign a season to students and have them dress their puppet appropriately for that season (winter or summer).

Resources:

BLM3a — <https://drive.google.com/file/d/1NVJXzeKkLHYurFNoF05IzXypbKJYreXE/view?usp=sharing>

BLM3b — <https://drive.google.com/file/d/0Bw9fk0hup-apM01mMzA3anJTUE03WlM5RDfLS0N3Q0NHhHfZ/view?usp=sharing>

Lesson #5

Climate Change

Time: 45 minutes

Materials:

- One pool noodle per pair of students (you can also use wrapping paper tubes).
- Ice cubes of equal size (one per table of students)
- Dishes to hold the ice (one per table of students)
- Pictures of Glaciers <https://climatekids.nasa.gov/career-earth-scientist/>
- Anchor Chart
- Markers

Essential Question:

What is Climate Change?

Lesson Objective:

Students will melt ice using their body heat to understand the effects a warming climate might have on glaciers.

Evaluation/Assessments:

This experiential learning activity is a great formative assessment to gauge how students are understanding the difference between weather and climate.

Steps 10-13 offer teachers the opportunity to gauge how and to what extent students are beginning to understand the effects of climate change.

Anticipated Challenges/Supports:

Challenges	Supports
For Students: Some may have a negative reaction to ice cubes in their hands.	Students who chose not to accept the challenge can take an active role in cheering on their team members while suggesting ideas for making the ice melt faster.

Standard(s):

1-ESS1-2: Analyze provided data to identify relationships among seasonal patterns of change, including changes in relative sunrise and sunset times, seasonal temperature, rainfall or snowfall patterns, and seasonal changes to the environment.

Scientific Practice 1. Asking Questions and Defining Problems

Vocabulary:

Academic	Descriptive
Climate change Glacier Sea level	Melt

Lesson Steps/Procedure:

1. Begin this lesson with a Climate Change experiential activity from TownGreen2025.
 - A. INCLUDE TUBE Experiential Activity directions
2. Review climate and weather and explain that when you look at the bottom of the tube, that is comparable to the weather, and focusing on the top or whole tube is comparable to climate. It's the big picture. So the bottom is similar to one sunny day and the top to a whole summer of warm days.
3. Next, students will try the ice-melting challenge activity. (Please have students wash their hands prior to beginning the challenge).
4. Each team of students will receive an ice cube in a dish.
5. The teacher will present the challenge: "We are going to have a competition to see which group can melt their team's ice cube the fastest. You cannot put the ice cube in your mouth, but you can use any part of your body to try and melt the ice."
6. Instruct all teams to begin at the same time and see which group can melt the ice cube first. Typically, the team that figures out that rubbing your hands together to create friction (or heat) and then holding the ice cube melts it the fastest. This concept can be related to climate and to how the Earth is warming and things like glaciers are melting.
7. Show pictures of glaciers and explain what they are. Two great resources are <https://climatekids.nasa.gov/career-earth-scientist/> and <https://climatekids.nasa.gov/10-things-glaciers/>.
8. Guide students through the pictures and websites and describe what glaciers are.
9. Discuss what will happen if the glaciers begin to melt. Relate this possibility to the ice cube challenge, since the glaciers would melt due to the Earth getting warmer. Show video — <https://www.youtube.com/watch?v=dzRvmjBGqp8>
10. For the next part of the lesson the class is going to relate the glacier example to climate change and how the Earth is getting warmer.
11. Choose one or two students to be models by asking for volunteers. Also request jackets and sweatshirts from other students to use in the demonstration.
12. Volunteers are going to put on layers of clothing to demonstrate how a few layers is comfortable but too many will make them hot and eventually uncomfortable.
13. Discuss how the Earth has 5 layers and climate change is adding more layers. Ask students how this might make the Earth feel and what they think might be causing this?
14. Define Climate Change.
15. Begin an anchor chart titled "Causes of Climate Change." This will be an ongoing list used throughout the rest of the lessons.

Resources:

Climatekids.nasa.gov - search "Glacier"



Lesson #6

Climate Change and Global Warming

Time: 30 minutes

Materials:

- 2 clear glasses
- Cheesecloth
- Rubber band
- 10 ice cubes
- Anchor chart
- Markers
- BLM4

Essential Question:

What effect does global warming have on our planet?

Lesson Objective:

Students will measure the effects of melting ice on water levels.

Evaluation/Assessments:

This lesson is all about introducing terms and having the students predict outcomes. In step 9, make observations of students' understanding that ice above water raises the water level but that ice in the water does not.

Anticipated Challenges/Supports:

Challenges	Supports
For Students: Greenhouse Gases can be intimidating terms.	The Greenhouse Gases can be printed in playing card form from the Climate Kids website. This might make them more interactive and less. https://climatekids.nasa.gov/greenhouse-cards/

Standard(s):

1-ESS1-2: Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, seasonal temperature, and rainfall or snowfall patterns, and seasonal changes to the environment.

Scientific Practice 1. Asking Questions and Defining Problems

Scientific Practice 8. Obtaining, Evaluating, and Communicating Information.

Vocabulary:

Academic	Descriptive
Greenhouse gases Water vapor Carbon dioxide Methane Ozone Nitrous oxide Chlorofluorocarbons (CFCs) Global warming	

Lesson steps/Procedure

1. Show this glacier video: <https://video.nationalgeographic.com/video/news/151021-glacier-national-park-melting-vin>
2. Set up the melting ice experiment:
 - A. Fill 2 glasses halfway full with warm water.
 - B. Fill glass A with 5 ice cubes and mark the water level on the outside of the glass.
 - C. Mark the water level on glass B.
 - D. Stretch a cheesecloth over the top of glass B, holding it in place with a rubber band. Suspend 5 ice cubes over the glass. Be sure that the meltwater is going into the glass.
3. Have students make a prediction about what they think will happen to the water level in each glass. (BLM4)
4. Next, review the “Causes of Climate Change” anchor chart from the previous lesson.
5. Meet the “Greenhouse Gases” on the Climate Kids website. <https://climatekids.nasa.gov/greenhouse-cards/>
6. Click on each greenhouse gas to discuss its positive and negative aspects. Be sure to point out where the gases come from, as students will need to know this for the final lesson of the unit.
7. Introduce global warming in relation to the other gases in the atmosphere: This is what happens when there is too much of each gas adding to the layers covering the Earth. The following video can help explain global warming - <https://www.youtube.com/watch?v=Vh8XVkzsn1Y> (0:00-5:30).
8. Add the greenhouse gases to the anchor chart. Note the sources of each gas; for example, emissions from factories, burning gas in cars, oil to heat your house, fertilizers, etc.
9. At the end of the lesson, observe the ice-melting activity and make note of what has happened.

Notes:

Don't forget to stop the video in step 7 at 5:30. The rest of the video can be shown later in lesson 10 if desired.

Resources:

BLM4 — <https://docs.google.com/document/d/1usJYW0Kbth06EgFYbtnMUONab6YTrkTujJeLyC7riCY/edit?usp=sharing>



Lesson #7

Polar Bears

Time: 40 minutes

Materials:

- Polar bear pictures (*located in resource section of this lesson*)
- Anchor Chart titled “Animals and Climate Change”
- Markers
- Nonfiction polar-bear texts
- BLM5

Essential Question:

How is climate change affecting animals?

Lesson Objective:

Students will conduct research to identify ways in which climate change is affecting the behavior and habitat of polar bears.

Evaluation/Assessments:

Completed BLM5

Rubric: *Completed BLM5 should show the following:*

1. Students were able to propose a research question.
2. Students were able to answer the research question by using facts they gathered from various sources.
3. Can students explain how the polar bear is being affected by climate change?

Anticipated Challenges/Supports:

Challenges	Supports
For Teachers: Finding non-fiction texts at an appropriate level for students may pose a challenge.	You may choose to read one non-fiction text aloud to the whole class and to gather facts along the way. You may also wish to use the Internet as a source for research.
For Students: Asking questions may be a challenge.	Teachers may wish to provide students with a list of research questions.

Standard(s):

1-LS1-1: Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and to produce food for the plant.

Scientific Practice 1. Asking Questions and Defining Problems

Scientific Practice 8. Obtaining, Evaluating and Communicating Information.

Vocabulary:

Academic	Descriptive
Research Polar bear Habitat Behavior	

Lesson Steps/Procedure:

1. Begin the lesson by displaying photographs of polar bears. Ask students, “What questions do you have about polar bears?” The teacher may want to record questions on a chart paper as they are shared
2. Pass out BLM5 and have students record their research questions. Encourage students to create their own questions or use one that has been given as an example.
3. Distribute various nonfiction texts on polar bears and have students collect facts to answer their questions. You may also use a video to collect facts on polar bears: <https://www.youtube.com/watch?v=-xEE7K67Xo>.
4. Have each students record a fact that answers his or her research question on BLM5.
5. Share out answers to questions collected earlier in the lesson.
6. Complete the Stepping Stone experiential learning activity here.
7. Show the video “Polar Bear Jail”: <https://www.youtube.com/watch?v=Dgzi2GXFWPk>
8. Review the chart on how climate change can affect the polar bear, crossing off details that are untrue and confirming those that are accurate.
9. Have students record on BLM5 how the polar bear is being affected by climate change.
10. Collect the completed worksheets and bind them to use as a reference for the culminating activity at the end of the unit.
11. Collect ideas of how climate change can affect the polar bear on an anchor chart titled “Animals and Climate Change.”

Notes:

The main point to address in this lesson is that the ice is taking longer to freeze than in the past, which makes it difficult for the polar bears to travel to their food source and hunt for seals.

Resources:

BLM5: <https://docs.google.com/document/d/11XCe5PBntq0gVa2Lcy4ydOSz06sqhVXcU9nIGsZ6UZg/edit?usp=sharing>



Lesson #8

The Snowshoe Hare

Time: 45-60 minutes

Materials:

- Anchor Chart titled “Animals and Climate Change”
- Markers
- Nonfiction texts about snowshoe hares
- Snowshoe hare photographs (attached to resource section of this lesson)
- BLM5
- BLM6
- White copy paper
- Brown and black construction paper
- 1 paper cup for each group of students

Essential Question:

How is climate change affecting animals?

Lesson Objective:

Students will identify ways in which climate change is affecting the snowshoe hare’s habitat.

Evaluation/Assessments:

Completed BLM5

Rubric: *Completed BLM5 should show the following:*

1. Students were able to propose a research question.
2. Students were able to answer the research question using facts they gathered from various sources.
3. Can students explain how the snowshoe hare is being affected by climate change?

Anticipated Challenges/Supports:

Challenges	Supports
For Teachers: Finding nonfiction texts at an appropriate level may pose a challenge.	You may choose to read a out loud one nonfiction text to the whole class and to gather facts along the way. You may also wish to use the Internet as a source for research.
For Students: Asking questions may be a challenge.	Teachers may wish to provide students with a list of research questions.

Standard(s):

1-LS1-1. Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and that (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and to produce food for the plant.

1-LS3-1. Use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same general kind.

Scientific Practice 1. Asking Questions and Defining Problems

Scientific Practice 8. Obtaining, Evaluating, and Communicating Information.

Vocabulary:

Academic	Descriptive
Camouflage Snowshoe hare	

Lesson Steps/Procedure:

1. Begin the lesson by displaying photographs of snowshoe hares. Ask students, “What questions do you have about snowshoe hares?”
2. Pass out BLM5 and have students record their research questions.
3. Distribute various nonfiction texts on snowshoe hares and have students collect facts to answer their questions. You may also use a video to collect facts on snowshoe hares: <https://www.youtube.com/watch?v=pzSREpa5CPc>
4. Have students record a fact that answers their research question on BLM5.
5. Share out answers to questions collected earlier in the lesson.
6. Begin the camouflage activity.
 - A. Pass out a white piece of paper (copy-paper size) to each team of students to represent the winter snow-covered habitat of the snowshoe hare.
 - B. Next, sprinkle a handful of paper dots (the product of a hole punch) from brown, black, and white paper onto the white snow-covered habitat.
 - C. Teacher demonstrates how to pick up dots using one (index pointer) finger only. Students are not allowed to grab dots in a handful.
 - D. Pass out a paper cup to each student on each team and instruct that this is where they will drop their dots.
 - E. Explain that the challenge is for students to pick up as many dots as they can in 10 seconds.
 - F. Begin the activity, stopping it after 10 seconds.
 - G. Once the group of students have stopped picking up dots, have the team sort their dots into different piles according to color. (Each team should have 3 piles.)
 - H. The teacher will collect and graph data from each group using BLM6.
 - I. Review the data and discuss the findings. (We that there are significantly more brown and black dots collected, demonstrating that camouflage kept the white dots out of the cups. This represents how the snowshoe hares’ white fur helps them camouflage themselves in snow.
 - J. Now post the challenge of what would happen if we changed the snow-covered habitat (white paper) to a dirt-covered (brown paper) habitat?
 - K. Have students discuss their predictions.
 - L. Repeat steps a-i, using brown paper instead of white.
7. Have students record how the snowshoe hare is being affected by climate change on BLM5.
8. Collect the completed worksheets and bind them to use as a reference for the culminating activity at the end of the unit.
9. Collect ideas of how climate change can affect the snowshoe hares on the anchor chart titled “Animals and Climate Change.”

Notes:

During the camouflage activity, be sure to have students use only their pointer fingers to pick up the dots. Dots will stick to their fingers; students are not allowed to grab a handful of dots.

When teaching this lesson the main point to get across is that the snowshoe hare’s fur color changes according

to the length of daylight. This means that the snowshoe hare will turn white as the days get shorter; however, the lack of snow (due to climate change) is making them stick out like a neon fast-food sign to their predators.

Resources:

These two articles discuss how the snowshoe hare is being affected by climate change:

<https://www.yaleclimateconnections.org/2018/01/snowshoe-hares-face-a-new-threat-warmer-winters/>

<https://news.nationalgeographic.com/news/2014/07/140717-snowshoe-hares-climate-change-environment-animals-science/>

BLM5: <https://docs.google.com/document/d/11XCe5PBntq0gVa2Lcy4ydOSz06sqhVXcU9nIGsZ6UZg/edit?usp=sharing>

BLM6: https://docs.google.com/document/d/1Ft9qyVLGVUAKvuoG8p_VLOaSCj7OSQWVUUJaXVshQjA/edit?usp=sharing

<https://www.youtube.com/watch?v=pzSRFpa5CPc> - Snowshoe Hare 1 minute video



Lesson #9

Oceans and Seashells

Time: 1 hour

Materials:

- Mollusk shells (mussel, oyster, clam, etc.)
- Chalk
- Water
- 16-oz. Glass jar
- White Vinegar
- BLM5
- BLM7
- Anchor Chart titled “Animals and Climate Change”

Essential Question:

How is climate change affecting animals?

Lesson Objective:

Students will understand ways in which climate change is affecting seashell development and the habitat of mollusks.

Evaluation/Assessments:

Completed BLM5

Rubric: *Completed BLM5 should show the following:*

1. Students were able to propose a research question.
2. Students were able to answer the research question using facts that they gathered from various sources.
3. Can students explain how seashells are affected by climate change?

Anticipated Challenges/Supports:

Challenges	Supports
For Teachers: Finding appropriately leveled nonfiction texts may pose a challenge.	You may choose to read aloud one nonfiction work, or document to the whole class and gather facts along the way. You may also wish to use the Internet as a source for research.
For Students: Asking questions may be a challenge.	Teachers may wish to provide students with a list of research questions.

Standard(s):

1-LS1-1. Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and that (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and to produce food for the plant.

Scientific Practice 1. Asking Questions and Defining Problems

Scientific Practice 8. Obtaining, Evaluating, and Communicating Information.

Vocabulary

Academic	Descriptive
Seashells Mussel Oyster Clam	Harsh

Lesson steps/Procedure

1. Begin the lesson by passing out various local shells to each group of students. Ask students, “What questions do you have about shells?”
2. Pass out BLM5 and have students record their research questions.
3. Show the videos on clams and seashells -- #1 <https://www.youtube.com/watch?v=FoIHWfSdGGs> and #2 <https://www.youtube.com/watch?v=KVFDfv6R2M>
4. Have students record a fact that answers their research questions on BLM5.
5. Share out answers to questions collected earlier in the lesson.
6. Begin the vinegar/chalk activity.
 - A. Provide each group of students a glass jar filled with ¼ cup of water.
 - B. Inform students that this water represents the ocean.
 - C. Give each group a piece of chalk to observe and make notes of their observations. (BLM7).
 - D. Instruct students to place a piece of chalk into each basin and observe what they see.
 - E. Let students know that chalk is made out of calcium, which is the same material a shell is made of. So, the chalk represents mollusks.
 - F. Next, add 1 cup of white vinegar to each jar, informing students that the vinegar represents the greenhouse gases that have gone into the ocean from our atmosphere and are making the ocean a harsher environment for sea life to live in.
 - G. Allow students time to observe what happens to the chalk when you add the vinegar. Plan for 10 minutes of wait time for the vinegar to begin to break down the chalk.
 - H. While waiting, gather students in a different area of the classroom and try the Keystone Experiential Learning Activity.
 - I. Remove the remaining chalk and record their observations.
 - J. Pose the question, “If this happens to chalk, how would climate change effect shells?”
7. Have students record how seashells are being affected by climate change on BLM5.
8. Collect the completed worksheets and bind them to use as a reference for the culminating activity at the end of the unit.
9. Collect ideas of how climate change can affect sea shells on the anchor chart titled “Animals and Climate Change.”

Notes:

Ocean acidification video for teacher background info - <https://www.youtube.com/watch?v=HJa9nwAkUNg>

Resources:

BLM5: <https://docs.google.com/document/d/11XCe5PBntq0gVa2Lcy4ydOSz06sqhVXcU9nIGsZ6UZg/edit?usp=sharing>

BLM7: https://docs.google.com/document/d/1h6K9_vXFageksJd3YPRfJb6PBizrY-0em2WEkl_Lok/edit?usp=sharing

Lesson #10

Climate Change Campaign

Time: Multiple sessions consisting of approx. 30-60 minutes.

Materials:

The anchor chart titled “Causes of Climate Change”

The anchor chart titled “Animals and Climate Change”

The book “The Tantrum that Saved the World” by Megan Herbert and Michael E. Mann.

BLM8 Outline for Climate Change Campaign

Essential Question:

How can humans stop climate change?

Lesson Objective:

Students will develop a campaign that helps combat one or more aspects of climate change.

Evaluation/Assessments:

Student scientists will be planning, creating, and presenting a Climate Change Campaign in which they identify a problem caused by climate change and design a solution to the problem.

Rubric:

	0	1	2	3
Identify Problem	The scientist is unable to identify an effect of climate change.	The scientist is able to identify an effect of climate change but gives unclear or incomplete information.	The scientist is able to identify an effect of climate change with accuracy.	The scientist is able to identify an effect of climate change with accuracy and provides details on the topic.
Cause and Effect	The scientist is unable to identify the cause of the problem.	The scientist is able to identify the cause of the problem but gives unclear or incomplete information.	The scientist is able to identify the cause the problem with accuracy.	The scientist is able to identify the cause of the problem with accuracy and provides details on the topic.
Define Solutions	The scientist is unable to identify a solution to the problem.	The scientist is able to identify a solution but gives unclear or incomplete information.	The scientist is able to identify a solution, using one of the 6 “R’s,” which is accurate and clear.	The scientist is able to identify a solution, using one or more of the 6 “R’s,” which is accurate and clear.

	0	1	2	3
Written Presentation	The scientist's presentation is unorganized or incomplete.	The scientist's presentation is complete but difficult to understand.	The scientist's presentation is complete and easy to understand.	The scientist's presentation is complete and organized, with a clear message.
Oral Presentation	The scientist is unable to present their work to the class.	The scientist is able to present their work to the class, but it is difficult to understand.	The scientist is able to present their work to the class and it is easy to understand.	The scientist is able to present their work with confidence and present a clear message.

* Printable versions can be found in resources section of lesson.

Anticipated Challenges/Supports:

Challenges	Supports
For students: Students may have trouble understanding cause and effect.	A teacher may ask leading questions to help students identify cause and effect.
For Teacher: Providing various ways for students to present information.	Teachers may want to use digital bookmaking tools like Book Creator or Story Bird for students to present their ideas. The book making tool is a great way to motivate a student who you anticipate may have trouble sharing in front of the whole class.

Standard(s):

1-K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solved by developing or improving an object or tool.*

1-K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.*

1-ESS1-2. Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, and seasonal temperature.

1-LS1-1. Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.

Practice 1. Asking Questions and Defining Problems

Practice 4. Analyzing and Interpreting Data

Practice 6. Constructing Explanations and Designing Solutions

Practice 7. Engaging in Argument from Evidence

Practice 8. Obtaining, Evaluating, and Communicating Information

Vocabulary:

Academic	Descriptive
Tantrum Campaign The 6 R's: <i>Refuse</i> <i>Repair</i> <i>Rot</i> <i>Reuse</i> <i>Recycle</i> <i>Reduce</i>	

Lesson Steps/Procedure:

Part 1:

1. Show the video Climate Change (According to a Kid) <https://www.youtube.com/watch?v=Sv7OHfpIRfU>
2. Bring out the anchor chart you have been keeping throughout the unit titled "Causes of Climate Change."
3. Discuss and review the chart. Add any new learning from the video in step 1.
4. Read the book "The Tantrum that Saved the World" by Megan Herbert and Michael E. Mann to the class.
5. Once the book has been read, allow time for students to brainstorm a way they may want to help the Earth by reducing the impact of climate change. Students can refer to the anchor chart and think of ways to fix or reverse those causes. They can think of what problem they want to fix. Pass out BLM8 for an outline to this model:
 - A. The problem is: Polar Bears are not able to reach their food source so they are looking for food in areas humans live.
 - B. Why is the problem happening?: The ice is not hard enough for them to go out and hunt for seals.
 - C. How is Climate Change causing this problem?: The earth is warming and melting the ice in polar regions.

Part 2:

1. Begin this lesson with an Experiential Learning Activity called "Helium Hoop"
2. Refer to the 6 R's (Refuse, Rot, Recycle, Repair, Reuse, Reduce) and introduce each concept to the class using "The World Saving Action Plan" poster in the book as a guide.
3. Students will be required to use one or more of these ideas within their campaign or action plan.
4. Give students examples of the model students should follow when developing the next steps to their action plan. (BLM8):
 - A. Which of the 6 R's will you focus on for your solution? How will you present your solution?

Part 3:

1. Allow students time to work on their projects.

Part 4:

1. Allow students time to share their projects with the class, school, community, or whoever may be impacted by their ideas.
2. Use rubric to assess student work.

Notes:

This lesson would be best taught by breaking it up into segments based on the Engineering Design Practices.

1. Identify the problem

2. Develop a plan/solution
3. Design a way to share their plan/solution

Resources:

Rubric for Climate Change Campaign — https://drive.google.com/open?id=1_yEcvqaq6dFKSRqd37-aXbKOpiAzYx9KIuWsinVjAxo

BLM8 — <https://docs.google.com/document/d/1tRiQabx8D1UrikCVFN-h4DIzvQ6OLQkkHTdrm93dZEI/edit?usp=sharing>

WORLD SAVING ACTION PLAN



Want to save the world? Working together, we can! Here's how:

1. Stop the burning of fossil fuels by letting your elected officials know you want clean, renewable energy solutions RIGHT NOW. Speak up and be heard!
2. Become a systems thinker. Nature's systems are circular and free from useless waste bi-products. We must think this way to restore balance to our ecosystem. Learn and think about life-cycles of energy and objects - from production, to use, to disposal.

Change takes effort and commitment. Don't be discouraged! Focus on what you can do and do it to the best of your ability.

10 THINGS YOU CAN DO

1. Turn off unnecessary lights and unplug appliances not in use.
2. Learn about your food - Where does it come from? How is it grown or produced? And where? How is it packaged? How does it affect your health and the health of the planet? Are you wasting it?
3. Grow your own food at home. Start with herbs and work your way up.
4. Create a composting system or a worm farm. Then use the compost to fertilize your garden.
5. Say 'NO!' to plastic. (That's bags, straws, plastic wrap, packaging, toothbrushes... it's everywhere!)
6. Ride your bike or take public transport. (Always make sure you are safe and that your parent or guardian gives you the okay.)
7. Fall in love with second-hand fashion... and books... and toys. Brand new is not always better. If you no longer need something, donate it to someone who does.
8. Learn to mend things. Sewing, tinkering, maintaining, and mending are World Saving Skills! Take pride in giving something old new life.
9. Eliminate any action that leaves you with landfill waste. Avoid disposable, single-use items.
10. Learn about nature by spending time in nature. Enjoy it, respect it, and discover how everything in our ecosystem is interconnected.

10 THINGS THE ADULTS IN YOUR LIFE CAN DO

1. Switch to renewable energy sources at home. (And in the office.)
2. Shop locally. Take reusable produce bags and grocery bags. Buy in bulk. Bring your own reusable containers.
3. Lower your carbon footprint by switching to an electric car, travelling by bicycle and public transport, and sharing rides.
4. Travel less frequently by airplane. Vacation close to home.
5. Buy things that are built to last. Buy items second-hand. Repair goods rather than replace them. Start a share economy with your friends.
6. Submit your household to a carbon audit to save the environment... and money!
7. Change the family diet. Cut down or eliminate red meat and dairy. Eat more plant-based foods and proteins. Eliminate processed foods and packaging-heavy take-out meals.
8. Choose products that have a low cost to the earth, rather than to your wallet. Examine the product's life cycle. Remember: less is best.
9. Replace harmful or toxic household products with natural alternatives.
10. Use appliances prudently. Boil only the water you need. Use the dishwasher only when full. If buying a new refrigerator, think SMALL - it saves energy and prevents food waste.

The 6Rs

REFUSE! Plastic, packaging, ANYTHING you don't need. Minimise!

REPAIR! Mend rather than throw away. Buy things designed to last.

ROT! Buy biodegradable, non-toxic products. Compost food waste.

REUSE! Extend an object's life. Repurpose, care for, and share.

RECYCLE! Can't avoid packaging? Recycle it!

REDUCE! Landfill, waste, your impact on the earth.

3 WORLD SAVING GAMES FOR THE WHOLE FAMILY

1. **ZERO WASTE CHAMPIONSHIP!** Set a weekly trash target and some fun rewards to help you meet it. How low can you go?
2. **NO-WASTE CHEF!** Become a family of economical cooks. Love your left-overs. Aim to never throw anything away. Compete for the best meal made only with what's in your pantry.
3. **URBAN FARMING AWARD!** Grow your own food. Teach your family members. And then have a family harvest competition.

3 WAYS TO BECOME A WORLD SAVING HERO

1. **COMMUNICATE WITH YOUR ELECTED OFFICIALS.** Find out who your government representatives are, then write to them, call them, email them, and arrange petitions to tell them what is important to you. Speak up and be heard!
2. **SHARE YOUR KNOWLEDGE WITH EVERYONE.** Start respectful conversations about how we can be better inhabitants of the planet.
3. **GET ACTIVE IN YOUR COMMUNITY.** Learn about the issues affecting your own community and become active in helping to solve them. Teach your teachers, teach your friends, spread your knowledge, and save the world!

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