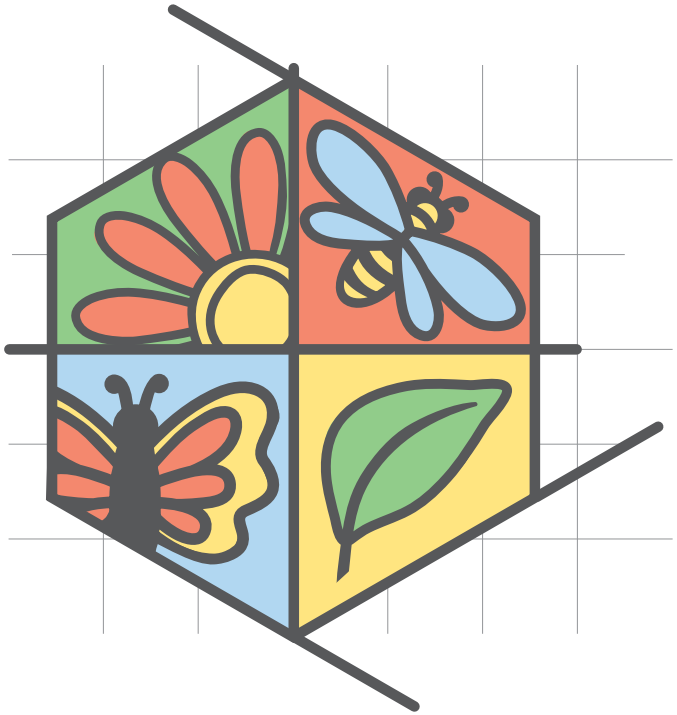

Environments

4th Grade Life Science Storyline

Save the Pika!

ATTRIBUTION

This unit storyline was written by Pranjali Upadhyay, Integrated Curriculum Specialist, with support from Stacy Meyer, Regional Science Coordinator, and Vickei Hrdina, Director of STEM Initiatives, Educational Service District 112. The unit, logos and graphics were designed by ESD 112's Design Services, led by Creative Director Heidi Barnes. Instructional materials are developed to support the following science kits:

- FOSS: Environments
- FOSS: Living Systems

This unit also contains links to online resources created by other organizations which may use a different license. Please make sure that you understand the terms of use of third-party resources before reusing them. Prior to publishing this unit of study, we have reviewed the content of this unit to ensure that all materials are in accordance with creative commons regulations. If you notice that a part of this unit infringes another's copyright, please contact ESD 112 at pranjali.upadhyay@esd112.org.

A digital copy of this document is available on the STEM Materials Center website at: https://www.stemmaterials.org/environments/

STEM
Science
Technology
Engineering
Math

A program of Educational Service District 112 supporting Next Generation Science Standards

A Note of Thanks

We would like to express our sincere gratitude to the Emily Hopple (K-2nd grade teacher, Skamania School District) and Ralph Pruitt (Superintendent, Skamania School District) for providing support in development of this unit and for providing high quality STEM experiences to their students. We are grateful to our partners at Pacific Education Institute: Chad Mullen, Lower Columbia FieldSTEM Coordinator and Kathryn Kurtz, Executive Director, for their support in integrating Field STEM experiences to make learning more authentic and engaging. Thank you to Steven Clark, Biologist and professor at Clark College for providing invaluable information about current pika research and helping to create a more authentic problem-based experience for students based on the practices and perspectives of current science.

Background on the Core Scientific Ideas in this Unit

WHAT WILL STUDENTS KNOW AT THE END OF THIS UNIT?

This integrated OER unit focuses on the 4th grade NGSS bundle addressing Structure, Function, and Information Processing (Performance expectations 4-PS4-2, 4-LS1-1, and 4-LS1-2). Students are engaged in a storyline which presents them with the problem of preserving the pika population who live in the Columbia River Gorge, a species which has recently been threatened in this region due to climate change. Through a series of activities, labs, and field STEM experiences, students engage in scientific modeling and investigation, while building their understanding of how an organism's internal and external structures enable survival, growth and reproduction. The unit culminates with the development of a product that can be shared with a public audience to instigate positive change in the community and help protect the pika.

UNIT OVERVIEW

Lesson No.	Duration	Standards	Focus	Assessment Options
1 **page 6**	3-4 days	4-LS1-1	**Students will:** ▪ Engage in an entry event about the pika. ▪ Begin their initial investigation of the pika and their habitat/adaptations. ▪ Model changing land and water through a lesson focusing on climate science.	N2K Chart
2 **page 10**	3-4 days	4-LS1-1	**Students will:** ▪ Create a terrarium and plant seeds which will sprout and grow. ▪ Engage in a Field STEM activity where they go outdoors and study plant structures. ▪ Obtain and evaluate information to learn more about the pika in its habitat. ▪ Create an initial model of a pika in its natural habitat.	Initial model of pika in its habitat Jigsaw of text (informal assessment)
3 **page 13**	3-4 days	4-LS1-1 3-5 ETS1-2 3-5-ETS1-3	**Students will:** ▪ Create and conduct an investigation to determine the optimum conditions for plant growth. ▪ Engage in an argument based on evidence (CER) ▪ Engineer a device that could keep a pika cool enough to survive in the summer. ▪ Further develop their model of a pika in its habitat.	CER Argument Developing model of a pika

UNIT OVERVIEW (cont.)

Lesson No.	Duration	Standards	Focus	CER Argument
4 page 18	10-12 days	4-LS1-1 4-LS1-2 4-PS4-2	**Students will:** • Plan and carry out an investigation to see which conditions are preferred by isopods and beetles. • Obtain and evaluate information about the structures of isopods and beetles help them survive. • Write a CER argument about where isopods and beetles are found. • Test their predictions from their CER in a field experience. • Explore how senses and stimuli help organisms survive through Field STEM and FOSS investigations. • Explore how light behaves through inquiry labs and a Field STEM "light and shadow walk" • Further develop pika model by adding zoom-in and zoom-out boxes.	CER Argument Developing model of pika Field STEM observations Engineering project
5 page 23	4-5 days	4-LS1-1 3-5-ETS1-2	**Students will:** • Conduct a climate science investigation to reconnect with the storyline. • Create a CER argument for why the pikas' plight is a serious one. • Create a final product to share with a public audience.	CER Argument Final product for public

LESSON 1: Meet the Pika

Strategy: Engage

In this integrated unit, students will explore the NGSS topical bundle addressing Structure, Function, and Information Processing through an investigation about the amazing Columbia River Gorge pika and how it is adapted to survive in its environment. Students will also take on the role of an environmental scientist and field biologist and study how climate change has affected the pika living in the Pacific Northwest. The story of the pika is the anchoring phenomenon that will tie together students' learning (through FOSS investigations and other OER activities). Please access this STEM Teaching tool #42 for more information on how to use phenomena to engage students in science learning.

Background information for teacher about introducing the pika who live in the Columbia River Gorge: Please read this short article about this pika population living in this area. The pika population who live in the gorge are puzzling to scientists because they are the only population that is currently living at this low of an elevation. All other known population of pika live in higher elevations, as the species is adapted to higher elevations and colder temperatures. Most mammals that are adapted for higher elevations and cooler temperatures hibernate over the winter. The pika, however, is adapted to survive winter without hibernation; it stores food for the winter and survives off its stashed food. In the Columbia River Gorge area, pika will potentially be affected since temperatures have been rising over the summer and it is hard for them to stay cool enough to survive. Please read this article from the USGS for more information. Scientists are currently conducting the following inquiries: 1) Why is this cool temperature adapted animal living in the Columbia River Gorge where it is not very snowy? 2) Are the numbers of individuals in this population of pika going up, going down, or staying the same?

Entry event to engage students: First, ask students if they know anything about the pika. Have they ever heard of the pika? What do they think a pika looks like?

- **Pika photo and discussion:** Then, introduce students to the pika by showing students a picture of a pika. Ask students the following questions/prompts:
  - What kind of animal is it? [students will say it's like a mouse or it's a rodent]
  - Suppose I tell you it has a VERY tiny tail—much smaller than rodents. And suppose I tell you its closest relatives have longer ears, then what would you guess? [It is a member of the rabbit family].
  - If I told you this animal usually lives in very cold places, what are some some traits or behaviors you think it might have to survive in very cold places? [Possible answers: dense fur (yes), warm burrows.]
  - If these animals are rabbits, why are their ears so short? [Mammals that live in cold areas generally have shorter ears and tails and "fingers" so they don't get so cold; a long ear would get too much cold air around it and it would be hard to keep the tissue warm].

Materials Needed

Computers with internet access.

Chart paper

Colored pencils and markers

Materials for It's Really Heating Up in Here!:

- 1 box modeling clay
- 1 medium-sized, deep, aluminum tin (such as an aluminum pie tin)
- 1 box plastic wrap
- 1 6-8 oz. paper cup, filled with water and frozen
- water

The Greenhouse Effect Reading

LESSON 1 (cont.)

- **Pika videos and articles:** Then, further engage students by sharing the following videos and articles:
  - Present students with this video about pika disappearing due to climate change. Ask students to share what they learned from the video.
  - Video of baby pika. Although pika look like groundhogs or other rodents, they are actually closely related to rabbits.
  - Present students with this article with info about the pika by giving one section to each group of 3-4 students. Have students read their section and synthesize a summary with points to be shared with the rest of the class. Use the first section to model the process.

ELA extension: Which information source did you feel is more informative, the picture, a video or an article, and why? Which one gave you more information that you could use to understand more about the pika?

Present students with the driving question: *How have humans affected the survival of the pika living in the Columbia River Gorge?*

Tell students that their mission for this unit will be to answer the driving question and present their findings to the public to increase awareness.

Career connections: **Fish and Wildlife Biologist.** Introduce students to the career of a Fish and Wildlife Biologist. This video can help students to learn a little about what a Wildlife Conservation Biologist does. After students watch the video, ask them what a Wildlife Biologist does. Do they think the job of a wildlife biologist is important? Why or why not? Ask students to think about the driving question. What does a conservation biologist do that is similar to what we will be doing in this Unit?

Creating a Need-to-Know (N2K) Chart: Work with students to create a N2K chart, which will help the class monitor their project to help the pika population survive and thrive. The N2K chart is used to help involve students in the process of investigation and to encourage them to think about the driving question and articulate their wonderings. Students may need help identifying things in their need to know section, and this is an opportunity for the teacher to facilitate a process where students are taking ownership in and interest in the content that will be covered throughout the Unit.

Climate Science Lesson: In order for students to understand the impact of rising global temperatures on the pika population living in the gorge, it will be helpful for them to first study the phenomenon of climate change. The following lessons will allow students to model the greenhouse effect which will help them develop an understanding how humans are impacting the Earth's natural processes, which is causing a rise in global temperatures and affecting the pika.

- It's Really Heating Up in Here! In this lesson, students observe the temperature in a system increase as ice melts, modeling the process of global temperature rising as a result of melting ice on the Earth's surface. Use this article to extend student learning.
- Have students read this article about the pika and its ideal conditions. Why is the Gorge such a "goldilocks" type environment for the pika? How might the rise in global temperatures change that? Ask students to draw a before/during/after model showing how the pika have survived in the Gorge before climate change and how their conditions are changing now. Students may need to look back at the information they collected from previous articles and videos in order to draw their models.
- After students have learned about the pika and about human induced climate change, facilitate a discussion and ask the following questions: What is in the pika's environment? How has the pika's habitat been changing over the years? What has caused that change? What do you think are some things that we can do to help the pika survive?

LESSON 1 (cont.)

Teacher Resources:

- This is a teacher resource video from the teaching channel about scientific modeling.
- This article from Ambitious Science Teaching talks about the importance of having students use scientific models to explain their thinking.

How Lesson 1 Supports Next Generation Science Standards

4-LS1 From Molecules to Organisms

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.
https://www.nextgenscience.org/dci-arrangement/4-ls1-molecules-organisms-structures-and-processes

Peformance Expectation	**Connections to Classroom Activity,** *Students:*
4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	▪ Study the Northwestern pika and how it uses its adaptations to survive in the mountains in the Columbia River Gorge. ▪ Create a model showing how the pika used its internal and external structures to survive and how global climate change is threatening its chance for survival. ▪ Collect data (or identify things they "need to know") in order to begin to construct an argument about how the pika's survival is threatened due to human caused changes in the environment. ▪ Ask questions to better understand the problem being faced by the pika and what other knowledge must be acquired to help solve the problem. ▪ Obtain information to understand and evaluate the problem being faced by the pika and how humans are contributing to the problem.
SCIENCE & ENGINEERING PRACTICES	
Developing and Using Models	▪ Develop a model to show how pika survive in their environment. ▪ Develop a model to show how the pikas' survival is threatened by increasing temperatures.
DISCIPLINARY CORE IDEAS	
LS1.D Information Processing	▪ Students study how the pika uses its internal and external structures to survive in its environment by interpreting information from its environment.
CROSSCUTTING CONCEPTS	
Systems and System Models	▪ Students study the systems within a pika that help it to survive in its environment. ▪ Students study the earth's systems and how they have been impacted by humans (and the resulting change). ▪ Students make connections between how the biosphere and the geosphere interact and affect one another.

LESSON 2: Responding to the Environment

Strategy: Explore

In this lesson, students explore how organisms interact with their environment by engaging in FOSS Investigation 1: Terrestrial Environments, a Field STEM activity, and continuing their exploration of the storyline about pika living in the Gorge.

FOSS Investigation 1: Terrestrial Environments

In this investigation, students plant terrariums and record changes in their terrarium over time. Please have students come back to the terrarium to observe chances and add to their models throughout the span of the unit. You can read pages 13-15 in the FOSS reader before setting up the investigation. Conduct the investigation as explained in the FOSS guide. In order to refocus the lesson on DCI LS1.A, ask students the following questions while they are recording their observations:

- What are the first structures or changes that you see in your seed?
- What does your seed need in order to grow? What does a plant need in order to grow?
- Why are the roots the first to sprout from the seed?
- What other structures does the plant need in order to survive?

ELA Integration: have students read pages 3-5 and 6-9 in their FOSS readers (Environments). You can use a jigsaw protocol to have teams take on different biomes (tropical vs desert) and then report back to each other and summarize their findings.

Career connections: **Field Biologist.** A Field biologist is someone who goes out into the habitat of an animal and studies it. Field biologists have been closely studying pika in the Colombia River Gorge over the past decade in order to survey the pika population (is it growing or shrinking), to take ecological notes (about how its habitat is changing, e.g. what trees and plants live in the area, how is the temperature changing or stabilizing), and to identify normal patterns that should be observed. Because a field biologist understands the habitat and needs of the pika, they can help identify changes in these patterns that might cause the pika to become less adapted to its environment and risk its survival. Help students become familiar with some of these experiences by showing this video from the Oregon Field Guide which features several field biologist including local field biologist and professor, Steven Clark, who is working on several projects to help us learn more about the pika and how they are being affected by Climate Change.

Materials Needed

FOSS Investigation 1: Terrestrial Environments

- Basins (6 liter)
- Basin cover
- Minispoon
- Plastic cups
- Sticky notes
- Container (1 liter)
- Beaker (100 mL)
- Seeds (clover, radish, barley, corn, and pea)
- Pitcher
- Basins
- Potting soil
- Tape
- Plastic wrap
- Lined paper
- Water
- Newspaper
- Paper towels

Other Materials:

- FieldSTEM Notebooks
- Computers with internet access
- Large Poster paper
- Markers, crayons, colored pencils and construction paper (for pika models)

LESSON 2 (cont.)

Field STEM opportunity: In this Field STEM activity, students will go outside and collect data in their school yard area and compare it to the environment a pika lives in. Use this lesson guide (Lesson 2: Descriptive Field Investigation, page 20) from the Pacific Education Institute to help plan the Field STEM experience for the students. Students will be taking detailed observations of one particular object, and then will be taking general observations of a large study area (looking up, looking down, and looking in the middle) to see what their schoolyard habitat consists of. Just focus students on a large study area (page 20-21). Once students are back in the classroom, facilitate a discussion by refocusing students' attention to the DCI LS1.A (Structure and Function), what are some structures that you see that help the plants survive in the ecosystem? What are some things you observed?

Connect with the storyline: Have students think about the pika's habitat and make observations of the habitat where pika live. Show students the videos linked below and ask them to make observations of the pika's habitat. This resource about the talus slope habitat from the Washington Nature Mapping program can also be used to gather some information. Facilitate a discussion where students have a chance to discuss: how is the environment in which a pika lives similar or different than the environment we have around our school? The teacher can model creating a venn diagram using this template. Students will be using a venn diagram to organize their thoughts in the next lesson and this is a good opportunity to model that process. Students are engaging in the SEP of Obtaining, evaluating, and communicating information.

- Columbia River Gorge Habitat
- The Perlious Plight of the Pika
- Pika and Restoration

Create an initial model of the pika: Have students create an initial model of the pika in its natural habitat. Students will want to include: a sketch of the pika, the habitat it lives in (rocks, trees, plants, etc.). Ask them to be sure to include things that the pika needs in order to survive. Students will be adding to this model as the unit progresses. They will be adding information about how the pika uses its senses to interact with its environment, which is why it is essential that they create the backdrop of the model and describe parts of the pika's habitat that it needs to survive.

How Lesson 2 Supports Next Generation Science Standards

4-LS1 From Molecules to Organisms

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https://www.nextgenscience.org/dci-arrangement/4-ls1-molecules-organisms-structures-and-processes

Peformance Expectation	**Connections to Classroom Activity,** *Students:*
4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	• Observe and study the structures of different plants that help them to survive and grow. • Study the structures that help a pika thrive in its environment by identifying how it interacts with its environment (ex. eats plants and has fur to keep it warm).
SCIENCE & ENGINEERING PRACTICES	

Developing and Using Models	• Develop a model to show how pika survive in their environment.
	  ▪ Include elements of the pika's environment
	  ▪ Include basic structures that the pika has to help it survive.

DISCIPLINARY CORE IDEAS	
LS1.D Information Processing	• Students study how the pika uses its internal and external structures to survive in its environment by interpreting information from its environment.
CROSSCUTTING CONCEPTS	
Systems and System Models	• Students study the systems within a pika that help it to survive in its environment. • Students study how the biological and geological parts of an ecosystem interact (how the pika interacts with its environment).

LESSON 3: Too Much or Too Little of Something

Strategy: Explain

In this lesson, students will continue to investigate how an organism survives in its environment and explore the conditions that allow it to thrive.

FOSS Investigations 3 and 6: In these investigations, students explore the impact of too little or too much water and salt on the growth of their plants and explain what the range of tolerance is of their plants. Instead of conducting both investigations separately, you can combine the investigations and have different groups investigate different variables (ex. three groups studying impact of too much or too little water, and three groups studying the impact of salt). What environmental conditions resulted in the best survival and growth in the plants? Ask students to share out their group's finding with the rest of the class. After all groups have had the chance to share, students can write an argument based on evidence for what the ideal conditions are for the plants and why. This template can be used to help students formulate their arguments. Since this CER template will be used a few more times throughout the unit, the teacher can model this process. Please see this sample as a guide for creating CER arguments.

Plants around the world activity: Present students with the question: How are plants different around the world?

- Show students the picture of a cactus and a monstera plant (swiss cheese plant). What characteristics do these plants have? You can use this thinking guide to have students label the characteristics they notice. Ask students how they are different and how they are similar. The teacher can make a venn diagram as a guide for the class discussion. Show students a picture of a desert, and a picture of a tropical rain forest.
- Ask them: how are these environments different and how are they similar? Ask them to make a claim; which environment do they think the cactus will thrive in and which one will the monstera thrive in? In the models that they started to draw with their thinking guide, have students add details about the environment (via drawings or captions) in which the plant lives. Ask students to use arrows and words to connect the traits that they described to the environmental condition that it helps them survive with. (ex. cactus stores water because it does not rain a lot in the desert, or monstera plant has large leaves with holes because it needs to spread out and try to catch as much sunlight as it can on the forest floor).

Connect with the storyline: Talk about the pikas' structures. Start this activity by facilitating a discussion about internal and external structures. The following prompts may be helpful:

- What types of conditions does the pika's habitat have?

Materials

FOSS Investigation 3: Water Tolerance

- Containers (1/2 liter)
- Zip bags
- Sticky notes or prepared labels
- Plastic cups
- FOSS tray
- Barley tray
- Seeds (barley, corn, pea, radish)
- Beaker (100 mL)
- Moist potting soil
- Dry potting soil
- Tray columns
- Pitcher
- Transparent tape
- Water
- Newspaper
- Paper towels
- Planters
- Meter tape

FOSS Investigation 6: Salt Tolerance

- Containers (1/2 liter)
- Containers (1 liter)
- Container lids
- Plastic cups
- Sticky notes
- Seeds
- FOSS trays
- Beakers
- Spoons
- Salt
- Potting soil
- Tray columns
- Basins
- Transparent tape
- Water
- Newspaper
- Paper towels

LESSON 3 (cont.)

- What are some of the characteristics of the pika that help them survive in this habitat?
- Have students revisit their model of the pika. So far, they should have created the pika in its habitat. Ask students to think about the external structures (structures you can see) that pika have that help them survive in their environment. Encourage them to label the body parts of the pika that are visible on the outside and explain what these structures do and how they help the pika survive.

Innovation/Engineering Design Challenge: Designing a Summer House for a Pika

Career connections: First, introduce students with the career of an engineer using this video. Engineers are people that solve the many problems that we encounter in our world on a daily basis. Some engineers solve problems by designing huge things (like bridges and buildings) and some engineers help people by creating smaller things like prosthetic limbs and artificial hearts. This interesting video shows the story of Winter the dolphin and how a biomedical engineer helped Winter to swim again. After the video, facilitate a discussion using the following prompts:

- What does an engineer do?
- In this case, how did the biomedical engineer help Winter?

Present students with the design challenge: Imagine and create a structure that will help a pika living in the gorge to survive in the heat of the summer. Before they engage in the actual engineering/imagining process, they will be exploring the insulating qualities of different materials through this Teach Engineering activity created for 4th grade: Stop Heat from Escaping: Testing Insulation Materials. Be sure to use "post-activity assessment" discussion questions to help students process the experience and connect to the storyline. Ask students to extend this investigation to experiement with how different materials can reduce the temperature of structures made of rock. Have students begin to think of how you could create a home for a pika that looks like its natural habitat (rock talice) that can help keep it cool in the heat. ***NOTE:*** *Collect empty water and soda bottles in advance.*

Present students with the engineering design process using this video. You can also print out this poster to display in the classroom to show the engineering design process.

This template can be used as a guide to help students through the process. Please revise to fit your students' needs.

Ask: What is the problem we are trying to solve? Why is it a problem for the pika? What are the conditions that we have to protect the pika from?

Imagine: What are some solutions to our problem? Any idea (no matter how crazy) is a legitimate one at this point in the design process. Ask students to draw or write each idea

Materials

"Stop Heat from Escaping" Lesson, each group needs

- 4 plastic water or soda bottles, 20-ounce (~590-ml) size*
- hot tap water*
- thermometer with a Fahrenheit scale
- sheets of newspaper*
- wool sock
- large piece of aluminum foil (enough to wrap around a bottle)
- large piece of thick, black plastic bag (enough to wrap around a bottle)
- tape
- Stop Heat from Escaping Worksheet
- Ice (for engineering design task)*

Other Materials

- FieldSTEM Notebooks
- Computers with internet access
- Large Poster paper
- Markers, crayons, colored pencils and construction paper (for pika models)

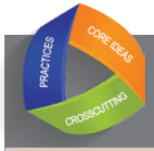
LESSON 3 (cont.)

Plan: Ask students to draw a diagram. What are the different materials you could use to create a safe space for the pika? How will it look? What shapes will you use? How will you construct it?

Create (optional): Allow students to create their pika habitat using materials provided (they can potentially reuse materials from the Teach Engineering lesson). If you do not have the resources to have students build their house for a pika, then you can have them refine their prototype diagram to have lots of details and descriptions about the features that make the house an effective insulator. If you do have the time and resources to build the pika house, provide students with thermometers to see if they can maintain a temperature of about 65 degrees in their pika's house when it is taken outside.

Improve: Facilitate a gallery walk where students are able to give one another "warm" and "cool" feedback on their designs. Provide students with post-it notes to write their feedback and share. Encourage students to make an optimized design that can be shared at the end of the Unit when students are designing a solution to help save the pika.

How Lesson 3 Supports Next Generation Science Standards



4-LS1 From Molecules to Organisms

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.
https://www.nextgenscience.org/dci-arrangement/4-ls1-molecules-organisms-structures-and-processes

Peformance Expectation	**Connections to Classroom Activity,** *Students:*
4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. 3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time or cost. 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	• Students observe and study the structures of different plants that help them to survive and grow. • Students study the structures that help a pika thrive in its environment by identifying how it interacts with its environment (ex. eats plants and has fur to keep it warm). • Students test and design a prototype house to keep a pika cool in the summer. • Students receive feedback and optimize their prototype design for a pika's house.
SCIENCE & ENGINEERING PRACTICES	

Developing and Using Models	• Develop a model to show how pika survive in their environment.
	  • Include elements of the pika's environment
	  • Include basic structures that the pika has to help it survive.
	• Construct an argument based on evidence to explain the conditions that are ideal for a plant when considering the variables of water and salinity.
	• Plan and conduct an investigation to determine which conditions are ideal for a plant.

DISCIPLINARY CORE IDEAS	
LS1.A Structure and Function LS1.D Information Processing	• Students study how the pika uses its internal and external structures to survive in its environment by interpreting information from its environment.

How Lesson 3 Supports Next Generation Science Standards (cont.)

CROSSCUTTING CONCEPTS	
Systems and System Models Patterns	• Students study the systems within a pika that help it to survive in its environment. • Students study how the biological and geological parts of an ecosystem interact (how the pika interacts with its environment). • Plants in the northwest and around the world share similar characteristics that allow them to survive.

LESSON 4: Senses and Survival

Strategy: Expand

This lesson will span over several weeks and will engage students in a variety of experiences that help them explore DCI LS1.D about how animals receive and process sensory stimuli. Please note that this lesson includes FOSS investigations from the Environments Kit and some lessons from Living Systems Kit (Investigation 4: Sensory Systems).

Day 1-3

FOSS Investigation 2: In this investigation, students will explore how isopods and beetles respond to their environment. As per NGSS DCI LS1.D, students are expected to understand how animals have sense receptors to receive and process sensory information. Frame this entire investigation to have more relevance to students by posing the question: Where in the schoolyard can we find isopods and beetles? Through the series of FOSS investigations, students will decide what conditions are most favored by the critters.

- In **Part 1**, students create animal runways and see how animals react to different quantities of water. Creating models of isopods and beetles. Have students look carefully at the isopods and beetles (use magnifying glasses if available?). What external structures do they see? Have students draw two models, one of the isopod and one of the beetle. After students have drawn out their models, allow them to use the internet to research and label the parts of the isopod. More importantly, have students write a caption explaining the function of each part. How are the isopods and beetles similar or different?
  - Kids Encyclopedia Article about Isopods
  - Kids Encyclopedia Article about Beetles
  - More about isopods: FOSS reader pages 16-17
  - More About beetles: FOSS reader pages 102-105
  - Pest world for kids: Pill Bugs
  - More about beetles
- In **Part 2**, Students will investigate to see if the isopods and beetles prefer dry, moist, or wet soil. Pause during these two investigations and redirect students' attention to the internal and external structures that allow the animals to sense their environment and move to a place where they are more comfortable. What type of environment do the isopods prefer? What type of environment do the beetles prefer? Have students revisit their models of the isopods and beetles and make revisions.
- In **Part 3**, students continue their investigation and study lighting preferences of the isopods and beetles. Have students catalog and share their observations and then revisit their models and make revisions. What amount of light do isopods and beetles prefer in their habitat?

Materials

FOSS Investigation 2: Bugs and Beetles

- Isopods & Beetles
- Plastic cups
- Plastic spoons
- Hand lenses
- Aluminum foil
- Stiff paper
- Meter tape
- Transparent tape
- Beaker
- Dry soil
- Potting soil (moist from bag)
- Basins
- Pitcher
- Plastic wrap
- Water*
- Paper towels
- Runways (construct with black construction paper)
- Construction paper
- plant matter (leaves grass, or twigs)*
- Hot-water bottle*
- Ice*

Other Materials

- FieldSTEM Notebooks
- Computers with internet access
- Large Poster paper
- Markers, crayons, colored pencils and construction paper (for pika models)

LESSON 4 (cont.)

Writing a CER Argument (modeled by teacher) answering the initial question: *Where in the schoolyard do you predict we will find isopods or beetles?* Present students with this template to organize their thoughts. Based on their investigations, what type of environment would an isopod or a beetle want to live in? What places in the schoolyard have these conditions? Have students **write a prediction** about where in the schoolyard they may find isopods and beetles. Students can use their models or CER arguments to help support their prediction. What evidence did they find in each part of the investigation that can be used to answer the question? What is the answer to the question (the claim)

Field STEM opportunity: Now that students have made a prediction about where they will find isopods and beetles in the schoolyard, take students outside to test their predictions. Provide students with several minutes to explore and come to make observations and take notes in their Field STEM notebooks. Where did they find insects and isopods? Did they find any? What types of conditions were present where they found the insects? If students did not find insects in the schoolyard, why is that so? Why was it hard to find insects? Were their predictions consistent with their findings? How so? Give students time to make sketches, drawings, notes and explanations in their field notebooks.

Day 4-6

FOSS Investigation 4 (from Living Systems): To delve deeper into the ways that organisms interact with their environment based on stimuli, students will further explore the ideas of stimulus and response. After each part of the investigation, have students connect back to the pika and how they can relate what they've learned to how a pika uses its senses for survival. This template can be used to help students log their findings and connect to the storyline. This may be a good point to check back with the N2K chart and see if students have answered any of the questions they had.

Connect with the storyline: Since students studied how insects and isopods use their senses to interact with their environment, we can now provide them with experiences that help them explore how other larger animals use their senses to interact with their environment. This will be helpful to them in understanding the internal (brain, nerves, limbs, eyes, etc) and external structures (skin, ears, etc.) that the pika use to interact with their environment.

- Pages 48-54 can be a helpful resource for students to read and talk about sensory input and survival.
- Use PEI (Pacific Education Institute) Unit 4B: Use your Senses (pages 49-54) to engage students in whole group activities where students explore how animals use their senses to understand how animals interpret cues in their environment and communicate with one another.
- Make the connection by first showing students the following videos about pika:
  - Life Cycle and Longevity of a Pika
  - Pika Conversation

Materials

FOSS investigation 4: Sensory Systems from Living Systems Kit

- Please use this FOSS web access code to access support materials for this investigation: **LSYP129183** www.fossweb.com
- Binder clips
- Cups w/lids and hole
- Dowels
- Noise makers

LESSON 4 (cont.)

- Then, facilitate a discussion where students think about the following prompt:
  - How does a pika use its eyes, ears, nose, mouth, hands, feet, fur to help it survive? How about things that we can't see? What structures does the pika have inside its body that help it survive? (ex. stomach, brain, heart) Allow students to research and find the functions of the internal structures if they are not entirely sure. Have students discuss in small groups and write their ideas on this page. Then have students add this information to their model of a pika in its environment. You can use post-its to add details to the model.
  - After students have worked in teams to write their ideas, challenge them to think of how two of these structures work together to help an animal survive. To support students who are struggling to make connections, you can have print these strips of matched structures and have them discuss connections in their groups. Also, it may be helpful to give students access to the internet so they can research the function of structures they are unfamiliar with.
  - Zoom-in Box Challenge: Challenge students to add to their model by creating a "zoom-in box" that peeks inside the pika's body and explains how an internal structure helps the pika stay alive (ex. student can create a "zoom-in" box for the brain, stomach, heart or lungs).

Days 7-10

How do we see things? (optional extension lesson): In order to tie together the life science and physical science strands in this NGSS bundle, this lesson combines a physical science investigation (from PBS.org) with a follow-up activity on animal eyes. ***NOTE:*** *Materials in this section not provided in Science Kit.*

Before:

- Have students create an initial model of how we see things. Ask them to draw a picture of an eyeball (human or pika) and describe how this organism sees things (note: the intent of this model is not correctness, but rather to help students articulate and access their pre-knowledge before engaging in the lesson).
- FieldSTEM experience before lesson: Engage students in light and shadow walk before engaging in light lesson (each group will need a flashlight). Ask students to also think about nighttime. How does your ability to see change during night. Ask students to identify something small at a far distance. Would you be able to see this detailed object at night? Why or why not? Why is light necessary for us to see? What about if you close your eyes? Why can't you see anymore? Have students share their ideas. In the next part of the lesson, students will study how light moves, and why light is necessary for sight.

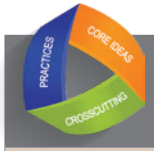
During:

- Engage students in Part 1 of this lesson on how light moves.
- Then, engage students in an exploration of animals and their varying eye structures using this PBS module, Night Vision.

After:

- Connect to the storyline: now that students know a little more about how light moves, ask them to add to their model of the pika. How does a pika see its environment? Is seeing an important part of the pika's survival? Why or why not? Challenge students to create a "zoom-in" box showing how a pika's eye uses light to see things in its environment.

How Lesson 4 Supports Next Generation Science Standards



4-LS1 From Molecules to Organisms

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.
https://www.nextgenscience.org/dci-arrangement/4-ls1-molecules-organisms-structures-and-processes

Peformance Expectation	**Connections to Classroom Activity,** *Students:*
4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	• Observe and create models of isopods and beetles and the structures they have that help them survive. • Conduct an investigation to explore how isopods and beetles interact with their environment and the conditions they prefer. • Construct an argument based on evidence about where they would find a beetle or isopod in their schoolyard. Students make predictions based on their argument and test their predictions in a FieldSTEM. • Students conduct investigations to study how light travels and how our eyes and brains use light to see. • Students create a model to show how the pika uses light reflecting from an object to see it and respond to stimuli.
SCIENCE & ENGINEERING PRACTICES	

Developing and Using Models
Engaging in Argument from Evidence
Planning and Conducting an Investigation
Analyzing and interpreting data
	• Further develop a model to show how pika survive in their environment.
	  ▪ Include elements of the pika's environment
	  ▪ Include basic structures that the pika has to help it survive.
	  ▪ Include internal structures (eyes and brain) that allow the pika to see and respond to its environment.
	• Conduct an investigation to explore the conditions that isopods and beetles prefer.
	• Construct an argument for where an isopod or beetle can be found based on tolerance and ideal conditions.
	• Analyze and interpret data to create a CER argument explaining where isopods and beetles are found.

How Lesson 4 Supports Next Generation Science Standards (cont.)

DISCIPLINARY CORE IDEAS	
LS1.A Structure and Function LS1.D Information Processing PS4.BElectromagnetic Radiation	• Conduct an investigation to see what conditions are preferred by isopods and beetles and how these organisms have structures that help them respond to their environment and survive. • Study how the pika uses its internal and external structures to survive in its environment by interpreting information from its environment. • Explore how light travels and interacts with our senses and brain to allow for sight.
CROSSCUTTING CONCEPTS	
Systems and System Models Cause and Effect	• Study the systems within a pika that help it to survive in its environment. • Create a model to show how a pika's brain system receives information from the environment (light) that allows it to see (and how lack of light causes lack of vision).

LESSON 5: Helping the Pika

Strategy: Evaluate

In this culminating lesson, students will have a chance to create a campaign to educate the public about the plight of the pika. Students will appeal to the community on what they can do to help reduce negative human impact on the pika population or help the scientific community to collect data on how this population is threatened.

Re-visiting climate Science Lesson: Have students revisit climate change and the greenhouse effect using this simple activity that models the greenhouse effect. Present students with the Oregon Zoo's Cascade Pika Watch Project that they can promote and engage in with their families or community members. This project is focused in helping to collect data in the Colombia River Gorge about the pika population and how it may be changing due to the changing environment.

Crafting an outline of the argument: Students can use the CER template to draft their argument, which will then be rewritten in the format of a letter or a presentation. Students are answering the question: How is climate change affecting the population of pika who live in the gorge? Have students revisit the articles that were given throughout the unit in order to extract information. Have a discussion with students where you ask them: What is the problem? How are the pika being threatened? Why won't the pika's current adaptations be enough if temperatures rise too much? Students should extract at least three pieces of evidence (from the research they have done throughout the unit) to include in their argument. Students can use their models to help them develop ideas about how the pika is under threat (ex. models should show that hot temperatures in summer are causing overheating).

Creating the public product: Students will be creating a presentation to educate the public about the plight being faced by pika living in the Columbia River Gorge. The presentation may include slides (google), a Youtube video, a podcast, a Scratch program, a series of memes, etc. You can use this slides presentation as a beginning guide to help them plan their presentaions. Encourage students to capture their audience and educate them on why the pika need help. The teacher can invite parents, administrators, and community members to attend the presentation day. Students can be given these checklists to help them create their product—please feel free to take and modify to fit your students' needs.

Materials

Computers with internet access

Misc supplies for creating presentations (markers, posters, colored pencils, construction paper, etc.)

Observe the Greenhouse Effect in a Jar:

- Two thermometers
- A notebook
- Pencil or pen
- A clear container, 1lt.
- Watch or clock
- A sunny area, either outside or inside

How Lesson 5 Supports Next Generation Science Standards

4-LS1 From Molecules to Organisms

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.
https://www.nextgenscience.org/dci-arrangement/4-ls1-molecules-organisms-structures-and-processes

Peformance Expectation	**Connections to Classroom Activity,** *Students:*
4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. 4-LS 1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. 3-5-ETS1-3: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	• Construct a CER argument to explain how the pika's changing ecosystem may create conditions in which it can no longer thrive. • Study information about the northwestern pika and how its internal and external structures increase its chances for survival and reproduction. • Refine the model of the pika in its environment. • Design and present a solution to help save the pika population in the Pacific Northwest.
SCIENCE & ENGINEERING PRACTICES	

Developing and Using Models
Engaging in Argument from Evidence
Asking Questions and defining problems
Constructing explanations and designing solutions
Obtaining, evaluating and communicating information
	• Refine a model to show how pika survive in their environment.
	  ▪ Include elements of the pika's environment
	  ▪ Include basic structures that the pika has to help it survive.
	  ▪ Include internal structures (ex. eyes and brain) that allow the pika to see and respond to its environment.
	• Construct an argument explaining why the pika is threatened.
	• Compile, re-read and evaluate information about the Pika.
	• Design a solution (based on evidence) to help save the Pika.
	• Communicate information (written and verbal) to either convince or educate an audience about the plight of the pika.

How Lesson 5 Supports Next Generation Science Standards (cont.)

DISCIPLINARY CORE IDEAS	
LS1.A Structure and Function LS1.D Information Processing	• Students study how the pika uses its internal and external structures to survive in its environment by interpreting information from its environment. • Construct an argument describing how a changing environment is affecting the pika's ability to survive and reproduce.
CROSSCUTTING CONCEPTS	
Systems and System Models Cause and Effect	• Study the systems within a pika that help it to survive in its environment. • Create an argument to explain how changing earth systems are causing a change in the pika's ecosystem which may risk its survival.

Name_____

KNOW/NEED TO KNOW LOG

Date_____Period____

What Do We Know?	What Do We Need to Know?	What Should We Do?
		(keywords, search engine, directory, etc.)

The Greenhouse Effect

What Is the Greenhouse Effect?

The “greenhouse effect” is so called because it is analogous to the process that keeps the air inside greenhouses (and parked cars) warmer than the air outside. The glass in greenhouse windows is transparent to visible light radiated from the sun. This light heats the surface of materials inside the greenhouse, which emit longer wavelength infrared radiation. Infrared radiation cannot penetrate the glass and is trapped, causing the inside air to warm up.

Water vapor, clouds, carbon dioxide, and other gases in our atmosphere act like the greenhouse glass by preventing some of the infrared radiation emitted by the earth to escape into space. Because the levels of carbon dioxide and other "greenhouse gases" in the atmosphere are increasing, more and more of the heat radiated by the earth's surface may become trapped in the atmosphere. This may result in "global warming," or the gradual warming of the atmosphere around the world.

From Where Do Greenhouse Gases Come?

Some greenhouse gases come from natural sources, such as volcanoes and forest fires. Because of the ability of these naturally formed gases to trap heat in the atmosphere, the Earth's surface is about 53°F (29°C) warmer than it would be without this trapping. This atmospheric heating makes the surface of the Earth warm enough for life.

Certain human activities can cause air pollution that magnifies the greenhouse effect in the atmosphere. The most important air pollutants that act as greenhouse gases are carbon dioxide, methane, nitrogen oxides, and chlorofluorocarbons. Methane is a product of natural decay from living (or once-living) things. Carbon dioxide and nitrogen oxides generally are a result of man-made burning, automobiles, and other internal combustion engines. Nitrogen oxides also can enter the atmosphere from fertilizers spread on fields. Chlorofluorocarbons (“CFCs”) are a class of chemicals once commonly used in air conditioners and refrigerators and as the pressurizing gas in aerosol spray cans.

While all of these pollutants contribute to the greenhouse effect and other air pollution problems, such as smog, carbon dioxide is the most important of the greenhouse gases because there is more of it in the atmosphere. Also, carbon dioxide levels have risen over 25% during the past century.

Another source of carbon dioxide is the clearing of rain forests in countries near the equator. The burning of tropical trees to clear land for crops releases carbon dioxide to the atmosphere. At the same time, trees that use carbon dioxide for photosynthesis are being destroyed.

What Will the Greenhouse Effect Do?

No one can predict for certain the impacts of the increasing levels of greenhouse gases in the atmosphere. Researchers think that the average temperature of the lower atmosphere will increase by 3°F to 9°F (l.6°C to 5°C) over the next 30 or so years. This may not seem like much, but the average world temperature during the last Ice Age was only 5.4°F (3°C) lower than it is now.

Researchers have attempted to predict the effects of increased global temperatures using sophisticated computer models. Most predict that warmer temperatures will be greater in winter than in summer and greater at higher latitudes than the equator. One thing seems certain, global warming of a

few degrees Celsius will cause major shifts in global weather patterns. Tropical storms may become more severe or hit land in different places. Areas that now receive plenty of rain for crops may suffer more droughts. One area where rainfall is predicted to decrease is the central U.S., which produces much of our food crops.

Global warming also may cause sea level to rise. The oceans are storehouses of heat. By storing some of the increased heat, ocean temperatures will rise, causing them to expand. In addition, warmer temperatures may melt the polar ice caps to some degree. A rise in sea level will flood low-lying areas where many people now live, for example low-lying parts of the state of Florida, many major cities around the world, and the country of Bangladesh.

The increased temperatures, changes in weather patterns, and sea level rise will have disastrous effects on many natural habitats and the plants and animals that live in them.

While most scientists believe that the green-house effect will gradually warm up the Earth's climate; some believe that warmer temperatures will increase cloud cover, reflecting more sunlight away from the Earth and eventually lowering the average temperature. This increased reflectivity is called the Earth's albedo.

How Do We Detect the Greenhouse Effect?

During this century, the average global temperature has increased 1°F (just over 0.5°C). During the 1980s, the Earth experienced four of the hottest years ever recorded.

Governments and scientists around the world have been recording temperatures and levels of greenhouse gases in the atmosphere for years. Measurements are taken at the ground and aloft by airplanes and balloons. Remote sensing instruments in satellites also can be used to provide data on temperatures, winds, and other atmospheric and oceanic conditions.

How Do We Reduce Its Effects?

We can reduce the effects of global warming by reducing or stopping the activities that cause greenhouse gases to enter the atmosphere. We should do our best to burn less fossil fuels by switching to alternative, cleaner sources of energy and ban the use of CFCs* and other chemicals that increase the greenhouse effect. Protecting the world's forests and planting more trees also will help. A growing tree can take in more than 20 kilograms of carbon dioxide a year.

* The use of CFCs has been drastically reduced in the past couple of years due to the Montreal Protocol, which called for a global reduction in CFC production. Although CFCs are no longer used in the production of new refrigerators and air conditioners, a few manufacturing processes still use them.

Source: Project A.I.R.E. (Air Information Resources for Educators), Air Quality Curriculum, U.S. Environmental Protection Agency, http://www.epa.gov/region01/students/teacher/airqual.html

Dear teachers, please make a copy of this document in your own google drive and then share with students to access. Student google accounts are not able to access external google drives. Thank you so much! :)

Name _____ **Date** _____

Columbia River Gorge's tiny pikas may help us see the effects of climate change

The Columbia River Gorge is home to an unusual population of pikas, possibly the most adorable predictors of climate change.

In order to figure out how many pika are living in the Gorge and where, the U.S. Geological Survey is asking citizens to become scientists and to help research the problem.

Pikas-- small, round, fluffy cousins of rabbits--are better adapted to cooler climates and are usually found in high altitude habitats on rocky mountain slopes. However, the Pika that live in the Columbia Gorge are a little different. They thrive at lower elevations, only a couple hundred feet above sea level.

"There seems to be a certain goldilocks set of factors that allow the gorge to support pikas at such a low elevation," said USGS researcher Erik Beever. "It's never super hot or super cold, there's forage available year-round and there's a massive vertical wall that provides shade throughout most of the day."

Because these group of Pika are so sensitive to temperature, they can help us see how the changing climate is affecting animals.

"Anything that increases summer temperature is a problem, and anything that decreases snowpack in winter is a problem," said David Shepherdson, deputy conservation manager at the Oregon Zoo. Snowpack creates an insulating layer to protect from the cold, much like a snow cave.

Scientists have trained more than 175 volunteers to go hiking in the trails of the Gorge to collect data about the Pika population.

By Casey O'Hara
OREGON ENVIRONMENTAL NEWS
Updated Jul 16, 2014;
Posted Jul 16, 2014

Questions:

What kind of weather / environment do pika like to live in?

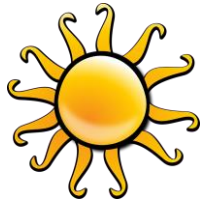
Dear teachers, please make a copy of this document in your own google drive and then share with students to access. Student google accounts are not able to access external google drives. Thank you so much! :)

Why are pika helpful in studying climate?

How are pika in the Columbia River Gorge unique?

What problems do pika face?

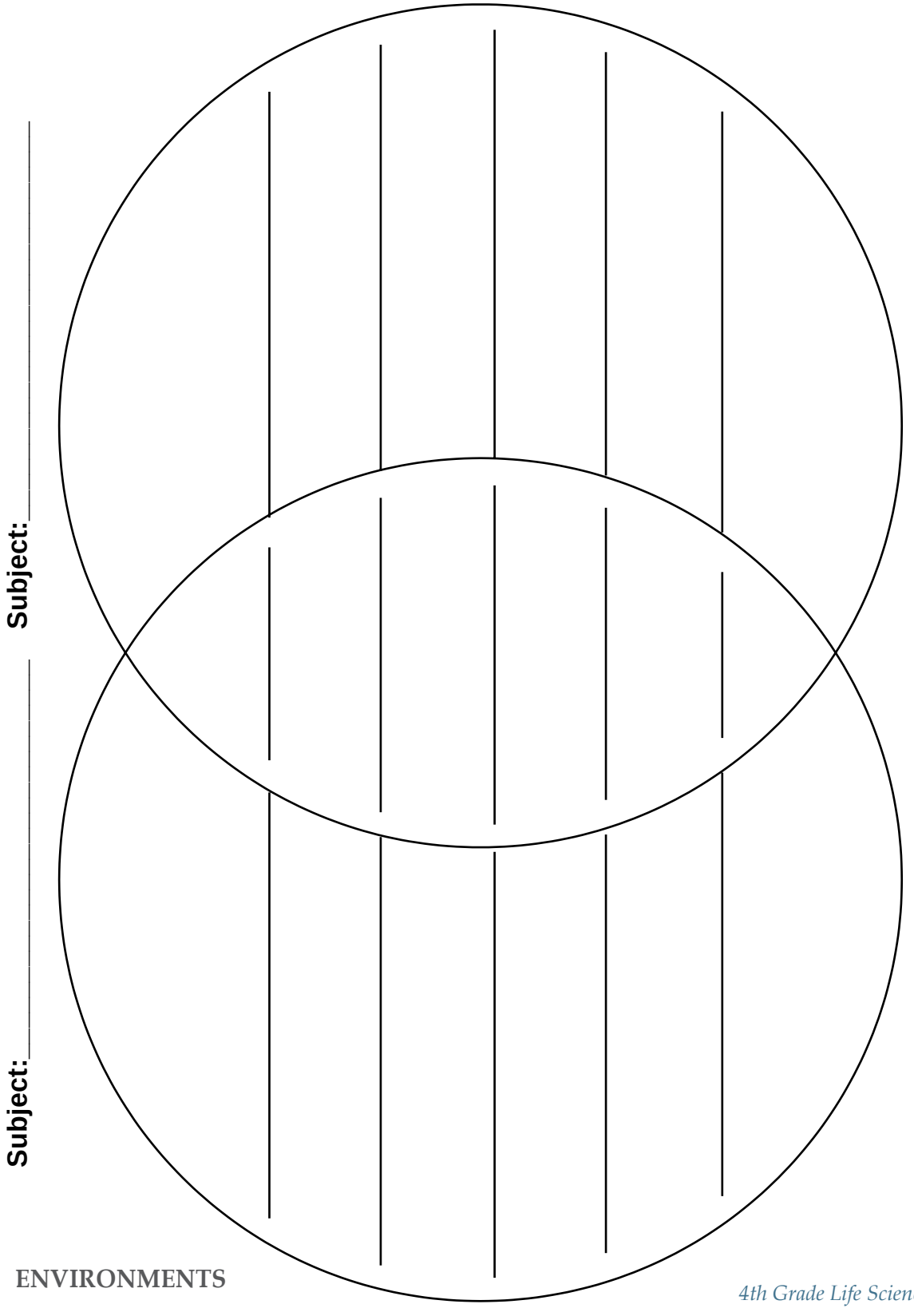
Pika **Before**, **During** and **After**

Before a changing climate	**During** (climate changing and getting warmer)	**After** (what can we predict will happen in the future?)
		

Name_____ Date _____

Venn Diagram

Write details that tell how the subjects are different in the outer circles. Write details that tell how the subjects are alike where the circles overlap.



My Final Scientific Claim

Question: What are the best conditions for a plant when considering the factors of water and salt in the soil?	
My Claim (aka, my answer to the question):	
Evidence # 1:	This evidence is important because:
Evidence # 2:	This evidence is important because:

My Final Scientific Claim

Question: What are the best conditions for a plant when considering the factors of water and salt in the soil?	
My Claim (aka, my answer to the question): The best conditions for a plant are a medium amount of water and a low amount of salt.	
Evidence # 1: The seeds that were not watered did not grow at all. The seeds that were watered grew to 3 inches and 6 inches tall. The seeds that were in soil that was very wet did not grow and got moldy after a week.	This evidence is important because: It shows that plants have optimum conditions in which they survive best. In this case, it means that they survive when they do not have too much or too little water.
Evidence # 2: The seeds that were watered with the 2 solutions with the more salt did not sprout, while the seeds that were watered with no (or very little salt) did sprout and grow.	This evidence is important because: It shows that plants have a range of tolerance of how much salt they can handle in the soil. If the salt levels are too high, then they are not able to get the water they need from the soil, and they will die.

Plant Structures and Survival

Team Names:_____ **Date:** _____

Stop Heat from Escaping Worksheet

1. Copy the problem question we are working on today.

_____

_____

2. Below are the four types of insulation we are looking at today. Make a prediction. Circle the one you think will keep the most heat from escaping.

Newspaper **Wool** **Aluminum Foil** **Plastic**

3. Fill in the following temperature chart with your observations:

Insulation	Beginning Temperature	subtract	Ending Temperature	equals	Change in Temperature
Newspaper		-		=	
Wool		-		=	
Aluminum Foil		-		=	
Plastic		-		=	

4. Draw a picture of your set-up below. (Draw and label the four bottles.)

5. What happened? Write two sentences for your conclusions.

6. What would you change next time you did this experiment?

7. Why would an ***energy engineer*** need to know about different insulation?

Engineering Design Challenge: A house for a pika

Your task: Create a house for a pika that will keep it cool in the summer and warm in the winter.

Ask: What is the problem we are trying to solve? Why is it a problem for the pika? Who caused the problem?

Imagine:

- What are some solutions?
- What materials might be good at keeping the house cool in the summer?
- What materials could keep it warm in the winter?

Plan: Ask students to draw a diagram. What are the different materials you could use to create a safe space for the pika? How will it look? What

shapes will you use? How will you construct it?

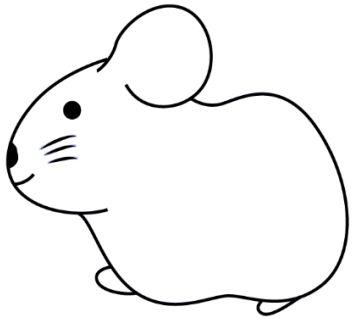
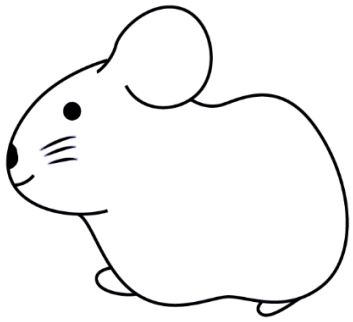


Image of pika is openly licensed by CC.4.0.

Create: Now take your best ideas from above and create a diagram showing your pika's new summer house.



Gallery walk & Improvements!

Pick one person from your team to be the "docent" who will explain the features of the pika house to guests that visit your table. The rest of the team will visit other teams and give them feedback on post-its.

Feedback Protocol

Warm feedback "I like that you included…" "I appreciated the design of…" "It was interesting that you…"	Cool Feedback (what can you improve) "I'm still confused about…" "Would you consider adding…" "I would have liked to have seen/heard…"

Now work with your group to optimize your design based on feedback. Share

My Final Scientific Claim

Question: Where in our schoolyard can we find isopods and beetles?	
My Claim (aka, my answer to the question):	
Evidence # 1:	This evidence is important because:
Evidence # 2:	This evidence is important because:
Evidence # 3:	This evidence is important because:

Evidence # 4:	This evidence is important because:
Evidence # 5:	This evidence is important because:
Evidence # 6:	This evidence is important because:

Stimulus/Response and Pika

Draw or write your ideas

Part 1: What types of behaviors or instincts does a pika have to help it survive? Brainstorm ideas with your team!	Part 2: What are things a pika sees that may catch its attention in its environment?
Part 3: What are some things a pika hears that may catch its attention in its environment?	What else?

Structures of a Pika

Structure	Function What does it do for the animal?
Eyes	
Ears	
Nose	
Mouth	
Fur	
Stomach	

Structures of a Pika

Brain	
Heart	
Other:	
Challenge: how do two of these structures work together to help the pika survive?	

My Final Scientific Claim

Question: Is the northwestern pika threatened?	
My Claim (aka, my answer to the question):	
Evidence # 1:	This evidence is important because:
Evidence # 2:	This evidence is important because:

Evidence # 3:	This evidence is important because:
Evidence # 4:	This evidence is important because:
Evidence # 5:	This evidence is important because:

Evidence # 6:	This evidence is important because:

Checklist for Creating a Slides Presentation:

Things to think about:

- ❑ Who is your audience?
- ❑ What is your purpose?
- ❑ How can you be most impactful (have the greatest effect)?

Things to do before:

- ❑ Finish CER argument
- ❑ Finish model of pika in its environment

Things to do:

- ❑ Create a slides presentation
- ❑ Have at least 10 slides
- ❑ Include background information and pictures of the pika and its environment.
- ❑ Include information about climate change and how it is affecting the pika.
- ❑ Include some options for what people can do to help.

Checklist for creating a video or podcast:

Things to think about:

- ❑ Who is your audience?
- ❑ What is your purpose?
- ❑ How can you be most impactful (have the greatest effect)?

Things to do before:

- ❑ Finish CER argument
- ❑ Finish model of pika in its environment

Things to do:

- ❑ Write a script of what you will say.
- ❑ Figure out what you will film
- ❑ Include background information and pictures of the pika and its environment
- ❑ Include information about climate change and how it is affecting the pika.
- ❑ Include some options for what people can do to help.