Science & Literacy Activity

GRADES 3-5

OVERVIEW

This activity, which is aligned to the Common Core State Standards (CCSS) for English Language Arts, introduces students to scientific knowledge and language related to adaptations. Students will read content-rich texts, visit the Bernard Family Hall of North American Mammals, and use what they have learned to complete a CCSS-aligned writing task, creating an illustrated text about how animals must be adapted to an environment in order to survive in it.

Common Core State Standards:
W.3-5.2, W.3-5.8, W.3-5.9
RI.3-5.1, RI.3-5.2, RI.3-5.4, RI.3-5.10

New York State Science Core Curriculum:
LE 3.1c

Next Generation Science Standards:
PE 3-LS4-3
DCI LS4.C: **Adaptation**
For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

Materials in this packet include:

- Teacher instructions for:
  - o Pre-visit student reading
  - o Visit to the Bernard Family Hall of North American Mammals and Student Worksheet
  - o Post-visit writing task
- Text for student reading: "Winter is on the Way..."
- Student Worksheet for the Bernard Family Hall of North American Mammals visit
- Student Writing Guidelines
- Teacher rubric for writing assessment

SUPPORTS FOR DIVERSE LEARNERS: An Overview

This resource has been designed to engage all learners with the principles of Universal Design for Learning in mind. It presents multiple ways for your students to engage with scientific concepts through reading, observing, discussing, and writing. While certain tasks may challenge individual students, we suggest that all learners participate in each part of the experience. In the paragraphs labeled "Supports for Diverse Learners" that supplement this activity, we have provided suggestions for how to adapt each section for students with different skill-levels. If any students have an Individualized Education Program (IEP), consult it for additional accommodations or modifications.

1. BEFORE YOUR VISIT

This part of the activity engages students in reading a non-fiction text about how animals must be adapted to an environment in order to survive in it. The reading will prepare students for their visit by introducing them to the topic and framing their investigation.

Student Reading

Have students read "Winter is on the Way...". Ask them to write notes in the large right-hand margin. For example, they could underline key passages, paraphrase important information, or write down questions that they have.

Ask:

- What is an adaptation?
  (Answers may include: adaptations are behavior or physical characteristics that help plants and animals survive in their environment)
- Give one example of a physical adaptation and one example of a behavioral adaptation.
  (Examples of physical adaptations: tree's protective bud scales, the snowshoe hare's color-changing coat, the grouse's foot fringe that enables it to walk in the snow. Examples of behavioral adaptations: hibernation, the caribou's migration, the pika stores hay for the winter.)
- What happens if plants and animals are not adapted to their environment?
  (Answers may include: They are unable to survive and will eventually die out.)

• Can individual plants or animals change their adaptations at will when habitat or environment changes?
(Answers may include: Adaptation happens over long periods of time. When an environment changes, some plants and animals survive better than others. Those that cannot survive die out.)

Students can work in pairs, small groups, or as a class. During discussion, remind them to use evidence from the text to explain their thinking, and to use specific examples.

SUPPORTS FOR DIVERSE LEARNERS: Student Reading
• "Chunking" the reading can help keep them from becoming overwhelmed by the length of the text. Present them with only a few sentences or a single paragraph to read and discuss before moving on to the next "chunk."
• Provide "wait-time" for students after you ask a question. This will allow time for students to search for textual evidence or to more clearly formulate their thinking before they speak.

2. DURING YOUR VISIT

This part of the activity engages students in exploring the Bernard Family Hall of North American Mammals.

Museum Visit & Student Worksheet
Explain to students that they will be divided into three teams – (1) jackrabbit, (2) North American beaver, and (3) mountain goat – and using worksheets to gather all the necessary information about connections between animal adaptations, environments, and survival. Each team will be responsible for recording observations about that animal. If time permits, have students complete worksheets for all three animals. Tell students that back in the classroom they will refer to these notes when completing the writing assignment.

SUPPORTS FOR DIVERSE LEARNERS: Museum Visit
• Review the Student Worksheet with students, clarifying what information they should collect during the visit.
• Have students explore the hall in pairs, with each student completing their own Student Worksheet.
• Encourage student pairs to ask you or their peers for help locating sources of information. Tell students they may not share answers with other pairs, but they may point each other to places in the hall where answers may be found.

3. BACK IN THE CLASSROOM

This part of the activity engages students in an informational writing task that draws on the pre-visit reading and on observations made at the Museum.

Writing Task
Distribute the Student Writing Guidelines handout, which includes the following prompt for the writing task:

> Based on the article "Winter is on the Way…", your visit to the Bernard Family Hall of North American Mammals, and your discussions, write an illustrated essay in which you:
>
> • define "adaptation"
> • explain why animals must be adapted to an environment in order to survive in that environment
>
> Be sure to include:
> • examples of three animals, their habitats, and the relationship between the needs and characteristics of each
> • labeled illustrations of each animal showing the adaptation(s)
>
> Support your discussion with evidence from your reading and the Bernard Family Hall of North American Mammals.

Go over the handout with students. Tell them that they will use it while writing, and afterwards, to evaluate and revise their essays.

Before they begin to write, have students use the prompt and guidelines to frame a discussion around the information that they gathered in the Bernard Family Hall of North American Mammals, and compare their findings. They can work in pairs, small groups, or as a class. Referring to the writing prompt, have students underline or highlight all relevant passages and information from the reading, and their notes from the hall, that can be used in their response to the prompt. Instruct each student to take notes on useful information that their peers gathered as they compare findings. Students should write their essays individually.

SUPPORTS FOR DIVERSE LEARNERS: Writing Task

- Re-read the "Before Your Visit" assignment with students. Ask what they saw in the hall that helps them understand how adaptations help animals survive in their environment.
- Allow time for students to read their essay drafts to a peer and receive feedback based on the Student Writing Guidelines.

Student Reading

Winter is on the Way...

This article is adapted from *Nature and Science*, 1 November 1965: 8-9, courtesy of the American Museum of Natural History's Library.

If you had been living in North America many millions of years ago, you would have found the weather warm and damp all year around. There were no winters as we know them. Then the climate began to change. To survive, the kinds of plants and animals living then had to be able to live through the cold seasons.

As millions of years went by, certain kinds of plants and animals lived through the winter better than others. Others didn't do as well, and over the years, they died out. Today, the plants and animals that you find in the northern part of the United States all have ways of behavior or physical characteristics, called adaptations, that help them survive the winter season. Let's look at some of ways in which different kinds of plants and animals are adapted to live through the winter.

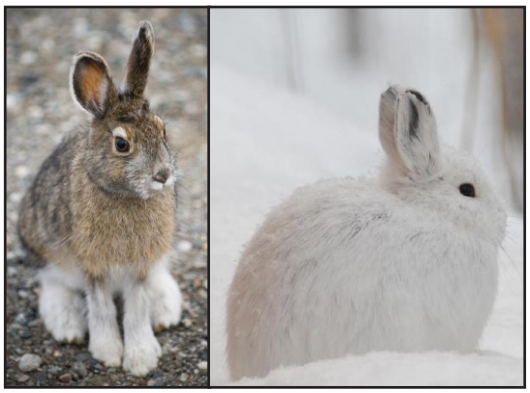
Hibernation is a deep sleep in which an animal's breathing, heart-beat, and other body processes slow down until the animal is barely alive. In this way, it survives the winter by using very little food energy. Hibernators include chipmunks, woodchucks, and some bats and mice. Some other animals such as bears and skunks, are not very active during the winter, but they do not hibernate.

Many trees seem to be dead in the winter. In a way, they are hibernating like certain animals. If you cut down through the twig, you will find that the young leaves that will bloom in the spring. They are protected from drying out by layers of tough bud scales.

Migration is not just for the birds. Some mammals, including caribou and some kinds of bats, also migrate. In summer, these caribou feed and raise their young in northern Alaska and Canada. Then they travel south, as far as 800 miles to forests that are somewhat protected from the arctic winter.

Most – but not all – caribou migrate to find food and reproduce. Some herds roam far; others stay local.

In summer, the snowshoe hare is a grey-brown. As winter nears, a new coat of white-tipped hairs gradually covers the animal. Soon the hare blends into the snowy background. Snowshoe hares also have large, hairy feet — "snowshoes" that enable them to move more easily over snow.



The snowshoe hare's coat changes color from season to season.

Feet that grow into a kind of "snowshoe" help the ruffed grouse walk on snow. These birds live in the forests of southern Canada and northern United States. In the fall, a comblike fringe grows on the edges of their toes. This fringe increases the surface of the birds' feet two or three times, enabling them to walk on the snow without sinking.

Making hay is the way that the pika prepares for winter. These rodents, about the size of a chipmunk, live on the rocky slopes of western mountains. Through summer, pikas cut stems of grass and put them in piles to dry. The dried "hay" is then stored among rocks for winter food.

Courtesy of the California Department of Fish and Wildlife

During late summer, the American pika collect plants and store them in "haypiles."

Look around this fall and winter and see if you can find other ways in which plants and animals adapt to survive.

Student Worksheet: TEAM Jackrabbits

Location of diorama:

Date/Time in the diorama:

Environmental Conditions (e.g. climate):

Draw the animal in its environment. Label its adaptations.

Think about the adaptations, such as size, behavior, and coloration, that help this animal survive in its environment.

How does each adaptation relate to where and how the jackrabbit lives?

What problems might the jackrabbit face without these adaptations?

Do you think these adaptations would enable this animal to survive in a habitat with opposite conditions? Why or why not?

What does that tell you about the relationship between environments and adaptations?

Student Worksheet: TEAM North American Beaver

Location of diorama:

Date/Time in the diorama:

Environmental Conditions (e.g. climate):

Draw the animal in its environment. Label its adaptations.

Think about the adaptations, such as size, behavior, and coloration, that help this animal survive in its environment.

How does each adaptation relate to where and how the beaver lives?

What problems might the beaver face without these adaptations?

Do you think these adaptations would enable this animal to survive in a habitat with opposite conditions? Why or why not?

What does that tell you about the relationship between environments and adaptations?

Student Worksheet: TEAM Mountain Goat

Location of diorama:

Date/Time in the diorama:

Environmental Conditions (e.g. climate):

Draw the animal in its environment. Label its adaptations.

Think about the adaptations, such as size, behavior, and coloration, that help this animal survive in its environment.

How does each adaptation relate to where and how the mountain goat lives?

What problems might the mountain goat face without these adaptations?

Do you think these adaptations would enable this animal to survive in a habitat with opposite conditions? Why or why not?

What does that tell you about the relationship between adaptations and environments?

ANSWER KEY

Student Worksheet: TEAM Jackrabbits

Location of diorama: *(Tanque Verde Ranch, Arizona)*

Date/Time in the diorama: *(June at noon)*

Environmental Conditions (e.g. climate): *(desert; very low rainfall, average 12 in/yr; hot days)*

Draw the animal in its environment. Label its adaptations.

Think about the adaptations, such as size, behavior, and coloration, that help this animal survive in its environment.

How does each adaptation relate to where and how the jackrabbit lives?

(Answers may include: Long ears help it keep cool; long legs help it stay high and cool and move quickly in case of a threat; the color of its coat helps it blend into the environment.)

What problems might the jackrabbit face without these adaptations?

(Answers may include: If its fur were a different color it might be easily spotted by a predator. If its ears and legs didn't help keep it cool, it might have difficulty living in such a hot environment.)

Do you think these adaptations would enable this animal to survive in a habitat with opposite conditions? Why or why not?

(Answers may include: If it lived in a cold environment it might need longer fur and shorter legs and ears to help it retain body heat.)

What does that tell you about the relationship between environments and adaptations?

(Answers may include:The environment that an animal lives in helps shape the adaptations that allow it to survive in that environment.)

ANSWER KEY

Student Worksheet: TEAM North American Beaver

Location of diorama: *(Hoister Creek, Central Michigan)*

Date/Time in the diorama: *(July evening)*

Environmental Conditions (e.g. climate): *(wetlands)*

Draw the animal in its environment. Label its adaptations.

Think about the adaptations, such as size, behavior, and coloration, that help this animal survive in its environment.

How does each adaptation relate to where and how the beaver lives?

(Answers may include: fur for staying warm, sharp teeth for cutting trees and building a home, webbed feet for swimming)

What problems might the beaver face without these adaptations?

(Answers may include: It might get cold without its waterproof fur. It might have a hard time swimming without its webbed feet or tail. If its teeth didn't keep growing it wouldn't be able to cut down trees and eat.)

Do you think these adaptations would enable this animal to survive in a habitat with opposite conditions? Why or why not?

(Answers may include: If the beaver lived on land all of the time it wouldn't need webbed feet or a tail that acted like a rudder. Its waterproof fur might make it over heat if it were not able to cool down in the water.)

What does that tell you about the relationship between environments and adaptations?

(Answers may include: The environment that an animal lives in helps shape the adaptations that allow it to survive in that environment.)

ANSWER KEY

Student Worksheet: TEAM Mountain Goat

Location of diorama: *(Tongass National Forest, Southern Alaska)*

Date/Time in the diorama: *(August)*

Environmental Conditions (e.g. climate): *(very cold, high altitude)*

Draw the animal in its environment. Label its adaptations.

Think about the adaptations, such as size, behavior, and coloration, that help this animal survive in its environment.

How does each adaptation relate to where and how the mountain goat lives?

(Answers may include: Specially shaped hooves and strong limbs allow them to climb steep inclines. Their fur coloration allows them to blend in with their environment allowing for protection against predators. They can use their horns for protection/defense.)

What problems might the mountain goat face without these adaptations?

(Answers may include: Without specially shaped hooves and strong limbs they would not be able to scale large inclines to live in mountainous areas. If their fur coloration was different or had a patterns it might not allow them to blend in with their environment making them more easily spotted by predators. Without their horns they wouldn't be able to protect/defend themselves from attacks except by running away.)

Do you think these adaptations would enable this animal to survive in a habitat with opposite conditions? Why or why not?

(Answers may include: If the mountain goat lived in a hot climate with no mountains, its coat might not be as useful to its survival because it might get too hot and not blend in with its surroundings as well. Strong limbs, hooves and horns might still help it protect itself by running or defending itself.)

What does that tell you about the relationship between adaptations and environments?
(Answers may include: The environment that an animal lives in helps shape the adaptations that allow it to survive in that environment.)

Student Writing Guidelines

Writing Prompt:

Based on the article "Winter is on the Way…", your visit to the Bernard Family Hall of North American Mammals, and your discussions, write an illustrated essay in which you:

- define "adaptation"
- explain why animals must be adapted to an environment in order to survive in that environment

Be sure to include:
- examples of three animals, their habitats, and the relationship between the needs and characteristics of each
- labeled illustrations of each animal showing the adaptation(s)

Support your discussion with evidence from your reading and the Bernard Family Hall of North American Mammals.

Use this checklist to ensure that you have included all of the required elements in your essay.

- ☐ I introduced and defined "adaptation."
- ☐ I clearly explain why animals must be adapted to an environment in order to survive in that environment, including examples of three animals, their habitats, and the relationship between the needs and characteristics of each.
- ☐ I included a labeled illustration of each of the three animals described, showing their adaptation(s).
- ☐ All of the information I presented is relevant to the relationship between adaptations and environments.
- ☐ I used information from "Winter is on the Way…" to explain the relationship between animal adaptations and their environments in detail.
- ☐ I used information from the Bernard Family Hall of North American Mammals to explain animal adaptations and their environments in detail.
- ☐ I included a conclusion at the end.
- ☐ I proofread my essay for grammar and spelling errors.

Assessment Rubric

	Scoring Elements	1 Below Expectations	2 Approaches Expectations	3 Meets Expectations	4 Exceeds Expectations
RESEARCH	**Reading**	Attempts to include text using examples, quotes, or other references.	Presents some information from reading materials but may lack accuracy or relevance.	Accurately presents information from reading materials relevant to the purpose of the prompt to inform or explain.	Accurately and effectively presents important information from reading materials to inform or explain.
	AMNH Exhibit	Attempts to include Museum exhibit content using examples, quotes, or other references.	Presents some information from Museum exhibit but may lack accuracy or relevance.	Accurately presents information from Museum exhibit relevant to the purpose of the prompt to inform or explain.	Accurately and effectively presents important information from Museum exhibit to inform or explain.
WRITING	**Focus**	Attempts to address the prompt, but is off-task.	Addresses the prompt, but focus is uneven.	Addresses the prompt with an adequately detailed response; stays on task.	Addresses key aspects of prompt in a detailed response; stays on task.
	Development	Attempts to inform or explain but lacks details.	Informs or explains by presenting some details.	Informs or explains using appropriate details.	Informs or explains by providing detailed and relevant information.
	Conventions	Lacks cohesion and control of grammar, usage, and mechanics appropriate to grade level.	Demonstrates an uneven command of standard English conventions appropriate to grade level.	Demonstrates a c ommand of standard English conventions, with few errors as appropriate to grade level.	Maintains a well-developed command of standard English conventions, with few errors. Response includes language and tone appropriate to the purpose and specific requirements of the prompt.
SCIENCE	**Content Understanding**	Content is irrelevant, inappropriate, or inaccurate.	Shows uneven understanding of disciplinary content related to the topic.	Presents generally accurate disciplinary content related to the topic.	Presents accurate and relevant disciplinary content to enhance understanding of the topic.