GIANT SCREEN FILMS

The Field Museum

ACTIVITY GUIDE

INTRODUCTION

The activities in the *Tiny Giants* Teacher Activity Guide are designed for use both before and after viewing the film *Tiny Giants*. To ensure that students derive maximum benefit from the film, the pre-viewing activities in this guide engage students and prepare them to explore specific themes as they watch the film. The post-viewing activities in this guide give students an opportunity to synthesize and further explore the information and topics they observed during the film.

FILM SYNOPSIS

In an adventure of giant proportions, *Tiny Giants* reveals the astonishing lives of the smallest of animals. Using the incredibly immersive power of specialist 3D cameras, audiences will be transported in a very intimate way into another world and experience the titanic battles these creatures face to survive. A chipmunk in a wild wood and a grasshopper mouse in Arizona's scorched deserts are both forced to grow up fast when they find themselves alone for the first time. Facing experienced rivals and huge predators, our chipmunk hero must find courage to gather enough nuts for winter. Forced out of the family home, our adolescent grasshopper mouse is then swept away in a flash flood. He needs to learn the skills to survive and lay claim to his own patch of desert as he becomes an adult. Only by using their ingenious 'superpowers' can our heroes not only stay alive but also become masters of their universe.

HOW TO USE THIS GUIDE

Research suggests that students learn more from an informal learning experience such as an informational film, if that experience is integrated into a broader body of learning.

In this activity guide you'll find pre and post film activities designed to support and further student learning sparked by *Tiny Giants*.

Each activity in this guide is designed to allow students to engage, investigate, reflect on, and share their learning of content that is aligned to the Disciplinary Core Ideas, Crosscutting Concepts, and Science and Engineering Practices of the Next Generation Science Standards.

Key vocabulary words for each activity are bolded and underlined in text. These terms can be introduced during the Engage portion of the activity and students should practice using them as they **Investigate** and **Reflect and Share**. Additional vocabulary terms that appear in the activity have been bolded and can be referenced in the glossary.

TABLE OF CONTENTS

TIPS FOR VIEWING TINY GIANTS

An effective way to focus and engage students during an educational film is to pose guiding questions that they can think about and try to answer while they watch. The guiding questions below align to the corresponding pre and post viewing grade-level activities in this guide. Encourage students to think about the grade-appropriate guiding questions while they watch *Tiny Giants*.

GRADES K-1

What sources of energy do different living things need in order to survive?
What are the food sources of the eastern chipmunk and the grasshopper mouse?
What animals are **predators** of the eastern chipmunk and the grasshopper mouse?
What **behaviors** help the eastern chipmunk and grasshopper mouse survive in their **ecosystems**?

GRADES 2-3

What kinds of **organisms** contribute to the **biodiversity** of a forest or desert **ecosystem**?
How are different **organisms** connected in an **ecosystem**?

GRADES 4-5

What do animals need to survive?
What special **adaptations** do animals have that allow them to obtain the things they need to survive in their **ecosystem**?
What physical **adaptations** and **behaviors** allow animals to survive in unique **ecosystems**?

WHAT'S FOR DINNER?

ACTIVITY DESCRIPTION

Through a sorting activity, students will make predictions about the sources of energy that different living things need to survive. Students will then use their predictions to create a story to tell how energy is transferred between three living things in an ecosystem.

GUIDING QUESTION

What sources of energy do different living things need in order to survive?

OBJECTIVE

Students will understand that all living things need energy to survive and different living things get energy from sunlight, plants, or animals. Students will understand that energy is transferred between living things through a food chain.

APPROXIMATE TIME

45 minutes

MATERIALS

- 1 copy of either the **Temperate Forest Ecosystem Cards** (page 6) or **Sonoran Desert Ecosystem Cards** (page 7) per pair of students
- Butcher paper or construction paper to create a **Food Chain Sorting Placemat** (see example on page 9) for each pair of students

MATERIALS PREPARATION

Make copies of the **Ecosystem Cards** from either the temperate forest or Sonoran Desert, and cut them out.
Note—if using the second set of cards as an extension, copy each on different colored paper.
Laminating the cards will allow for more extended use.
For each pair of students, create a **Food Chain Sorting Placemat** by drawing four large circles on a piece of butcher paper or construction paper. Label the four circles: Producer, Herbivore, Carnivore, and Not Sure.

KEY VOCABULARY TERMS

carnivore, food chain, herbivore, producer

STANDARDS

Next Generation Science Standards
Disciplinary Core Idea LS1.C: Organization for Matter and Energy Flow in Organisms
All animals need food in order to live and grow. They obtain their food from plants or from other animals.
Plants need water and light to live and grow.
Disciplinary Core Idea ESS3.A: Natural Resources
Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.
Crosscutting Concept: Energy and matter: Flows, cycles, and conservation
Science and Engineering Practice: Obtaining, evaluating, and communicating information

BACKGROUND

All living things need energy to survive. Most plants, also known as producers, get energy from sunlight, water, and nutrients. Animals get energy by eating other living things, either plants or animals. Animals that eat plants are called herbivores, while animals that eat other animals are called carnivores. Energy is transferred between living things in an ecosystem through a food chain from the sun to producers to herbivores, and then to carnivores. Note: See **Extensions** for information about omnivores.

PROCEDURES

ENGAGE

1. Ask students to think about and tell a partner what they ate for breakfast.
2. Encourage students to share out, and ask the class to think about and discuss where that food came from—did it come from a plant or an animal?
3. Explain that all living things need energy to survive. Plants get their energy from sunlight, water, and nutrients. Animals get their energy from eating plants or other animals. Introduce the terms **producer**, **herbivore**, and **carnivore**, and **food chain**.

INVESTIGATE

1. With students in pairs, give each pair a **Food Chain Sorting Placemat** and a set of **ecosystem cards** from either the forest or desert.
2. Ask each pair of students to work together to sort their cards into categories of **producers**, **herbivores**, and **carnivores** based on where each living thing gets its energy. If students are unsure about where to place a card, they can sort it into the "not sure" circle.

REFLECT AND SHARE

1. Encourage students to review their sorted cards. Ask students to look for and think about any similarities or differences between the living things within and between each category.
2. Review any plant or animal cards that students have placed in the "not sure" circle and help classify them based on their source of energy.
3. Tell each student to pick three organisms—one from each category.
4. With the three selected cards, have students create a story that tells how energy is transferred between the three living things in a **food chain** (for example, gray wolves get energy from eating North American moose, which get energy from eating acorns).
5. Encourage students to tell their story to a friend or ask them to share their story with the whole class.

DIFFERENTIATION

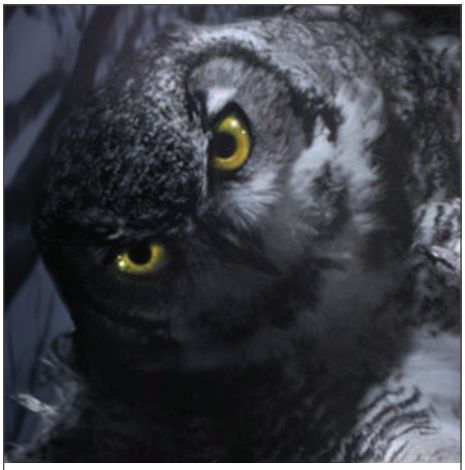
Extensions: Some animals get their energy from eating both plants and other animals—these animals are called omnivores. Ask students to discuss: Are humans **omnivores**? Why or why not? Ask students if they can think of any omnivorous animals that live in a **temperate forest ecosystem** (bears, raccoons, ravens) or in the **Sonoran Desert ecosystem** (coyotes, crows, roadrunners). Let students create new cards by drawing these animals on the blank card templates and sort them into a fifth circle.

Encourage students to write a short narrative of their story.

For extra practice, repeat this activity with the second set of ecosystem cards.

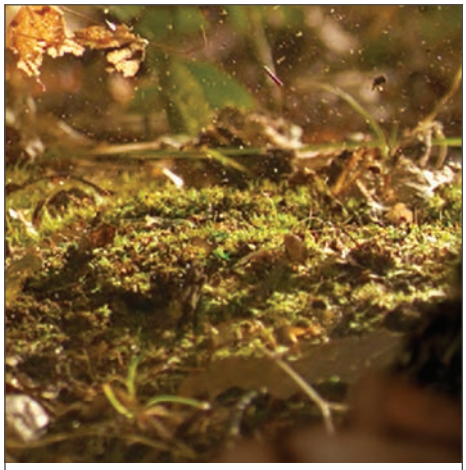
Modifications: To further scaffold this activity, complete a group activity instead of creating individual stories. Make a card for the sun on one of the blank cards. Gather students in the middle of the room. Separate the room into two sides by laying a piece of string on the ground. Hold up two cards from the same ecosystem, one on each side of the room divider. Tell students to take a step in the direction of the card that obtains energy from the other. For example, if a great horned owl card and eastern chipmunk card are held up, students should take a step toward the side of the great horned owl. If two organisms are not connected directly to each other through the **food chain** (two **producers**, or a **carnivore** and a **producer**) students should stay in the middle of the room and not move in either direction.

TEMPERATE FOREST ECOSYSTEM CARDS



great horned owl

gray wolf



moss

wood frog

eastern chipmunk

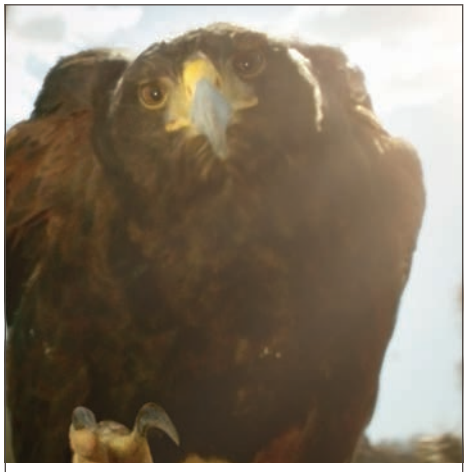
acorn

North American moose

garden snail

SONORAN DESERT ECOSYSTEM CARDS

grasshopper mouse



Harris hawk

cactus

tumbleweed

regal horned lizard

western diamond-backed rattlesnake

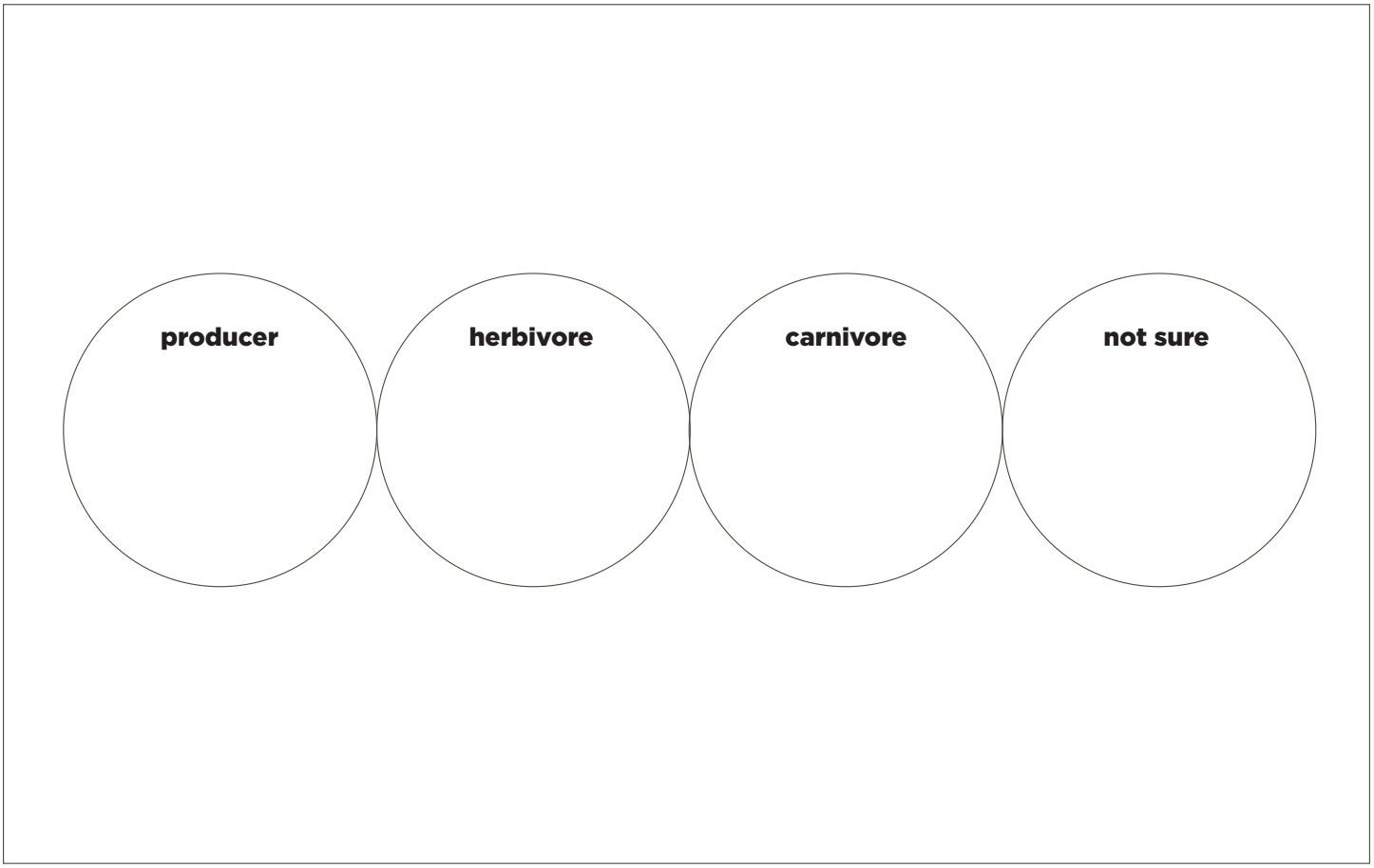
Desert hairy scorpion

Sonoran Desert tortoise

BLANK CARDS

Animal name: _____	**Animal name:** _____	**Animal name:** _____
Animal name: _____	**Animal name:** _____	**Animal name:** _____
Animal name: _____	**Animal name:** _____	**Animal name:** _____

SAMPLE FOOD CHAIN SORTING PLACEMAT



FOOD OR FOE?

ACTIVITY DESCRIPTION

By playing the part of the eastern chipmunk or grasshopper mouse, students will practice identifying the food sources and predators of these animals. Students will practice mimicking the behaviors that these animals show when they encounter food, predators, or dangerous weather that help them survive in their environment.

GUIDING QUESTIONS

What are the food sources of the eastern chipmunk or grasshopper mouse? What animals are predators of the eastern chipmunk or grasshopper mouse? How do the eastern chipmunk or grasshopper mouse act in response to food, predators, and dangerous weather to help them survive?

OBJECTIVE

Students will be able to identify the food sources, predators, and dangerous weather conditions that the eastern chipmunk or grasshopper mouse encounter by acting out the appropriate responses to each.

APPROXIMATE TIME

40 minutes

MATERIALS

- 1 copy of either the **Temperate Forest Ecosystem Spinner** (page 12) or the **Sonoran Desert Ecosystem Spinner** (page 13)
- 1 brad
- 1 paperclip
- 1 copy of the "A Day in the Life of..." cartoon template (page 14) per student

MATERIALS PREPARATION

Print and cut out the spinner for the chosen ecosystem. Poke a hole in the center of the spinner with a pencil and pin the paperclip to the center of the spinner with the brad. Flick the paperclip to spin.

KEY VOCABULARY TERMS

behavior, predator, prey

STANDARDS

Next Generation Science Standards

Disciplinary Core Idea LS1.C: Organization for Matter and Energy Flow in Organisms
All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

Disciplinary Core Idea ESS3.A: Natural Resources
Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

Crosscutting Concept: Energy and matter: Flows, cycles, and conservation.

Science and Engineering Practices: Analyzing and Interpreting Data; communicating information

Common Core State Standards For English Language Arts

W.K.3: Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.

W.1.3 Write narratives in which they recount two or more appropriately sequenced events. Include some details regarding what happened, use temporal words to signal even order, and provide some sense of closure.

BACKGROUND

In their search for food, the eastern chipmunk and grasshopper mouse must take care to avoid predators and dangerous weather. Special behaviors help these small animals survive in their environment.

To attain food, the eastern chipmunk gathers acorns and nuts in its cheeks and stores them in a burrow to eat during the winter. This animal uses its speed, flexibility, and a loud howl to escape from predators. Eastern chipmunks will enter torpor (a sleep-like state caused by lowered body temperature and slowed metabolism) to help them survive through the winter months.

The grasshopper mouse will stand upright and give a warning howl before attacking centipedes and scorpions for food. This animal takes advantage of its small size to find hiding places to avoid predators. If it gets wet, the grasshopper mouse can dry itself off quickly by forcefully shaking its entire body.

PROCEDURES

ENGAGE

1. Ask students to think about the eastern chipmunk or the grasshopper mouse that they saw in *Tiny Giants*.
2. Allow students to share their answers to the following questions in pairs or as a whole class: What did the eastern chipmunk or the grasshopper mouse eat? How did they find or gather food? What did these animals do when they met a **predator** to avoid becoming their **prey**? What other **behaviors** helped these animals survive through dangerous weather conditions like cold temperatures or rain?

INVESTIGATE

1. Explain that animals have **behaviors** that help them to find food, avoid **predators**, and survive through dangerous weather conditions.
2. Tell students that they will practice acting out the survival behaviors of either the eastern chipmunk or grasshopper mouse.
3. On the board or poster paper, copy the chart below that relates to the ecosystem chosen for study.

Temperate Forest

Category	Spinner Items	Student Action
Food	acorn	Act out eating or digging to bury the acorn
Predator	great horned owl, gray wolf	Jump, run in place, and make a warning howl
Weather	freezing temperatures	Pretend to go to sleep

Sonoran Desert

Category	Spinner Items	Student Action
Food	desert hairy scorpion, desert centipede	Stand upright and howl. Use teeth and fingers to bite and claw at the air
Predator	western diamond-backed rattlesnake, Harris hawk	Crouch down to hide
Weather	rain	Shake vigorously to dry off

4. Go through each of the categories and items on the **Ecosystem Spinner** of the selected ecosystem and practice each appropriate action with students.
5. With students standing in a circle, place the spinner in the middle and allow students to take turns spinning. All students should act out the appropriate behavior that the eastern chipmunk or grasshopper mouse would have after each spin.
6. Continue spinning until each student has taken a turn.

REFLECT AND SHARE

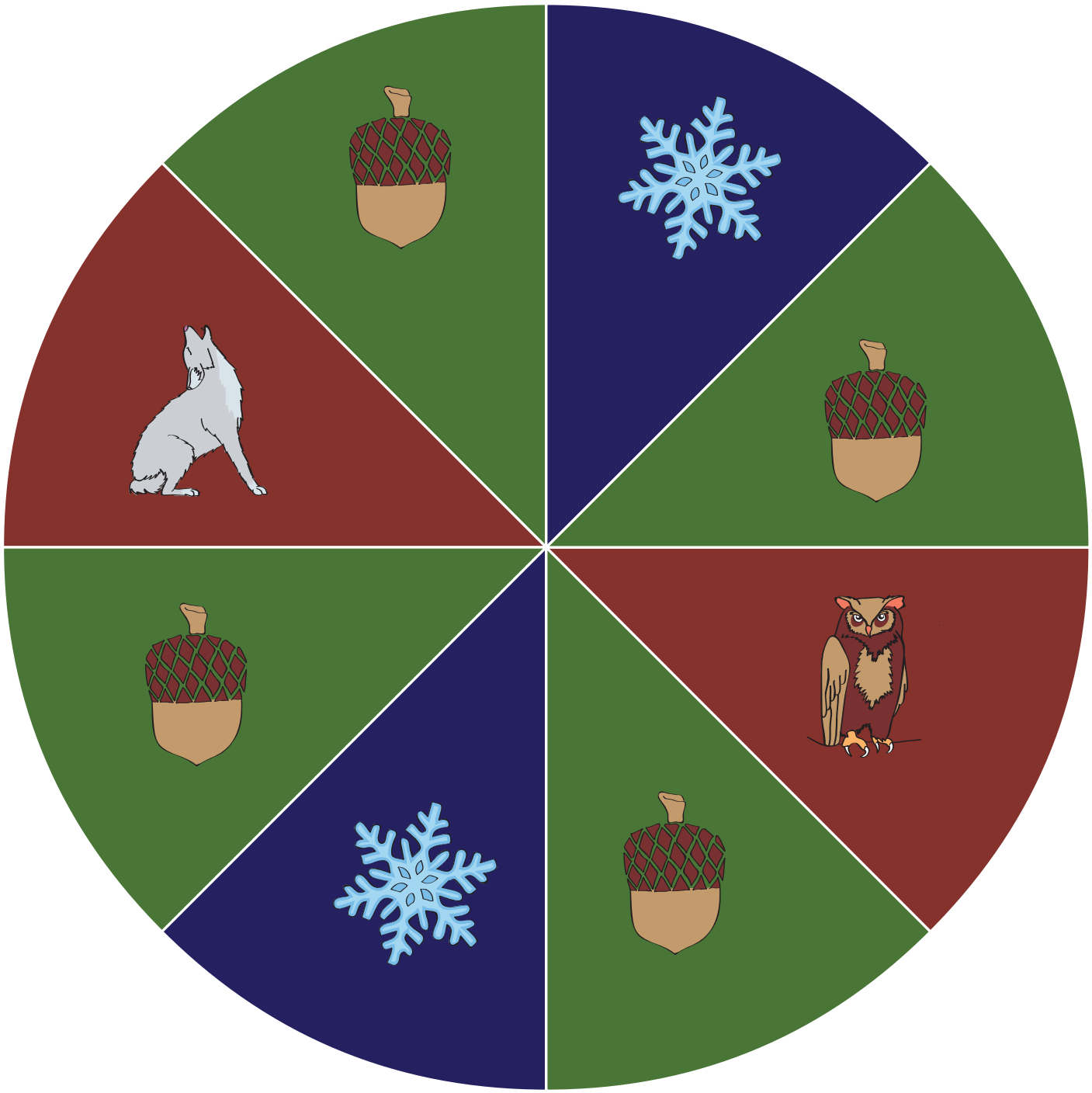
1. Give each student a copy of the "**A Day In The Life of...**" cartoon template. Instruct students to fill in the blank line with the name of the animal they want to make the main character of their cartoon, either the eastern chipmunk or the grasshopper mouse.
2. Tell students to draw a cartoon about their main character in the three panels of the cartoon template.
3. In their cartoon, the chipmunk or mouse will be the main character, but students should also include at least one food source and one **predator** of their chosen main character. They can also include a weather condition, if they like.
4. Encourage students to explain their cartoon to a friend.

DIFFERENTIATION

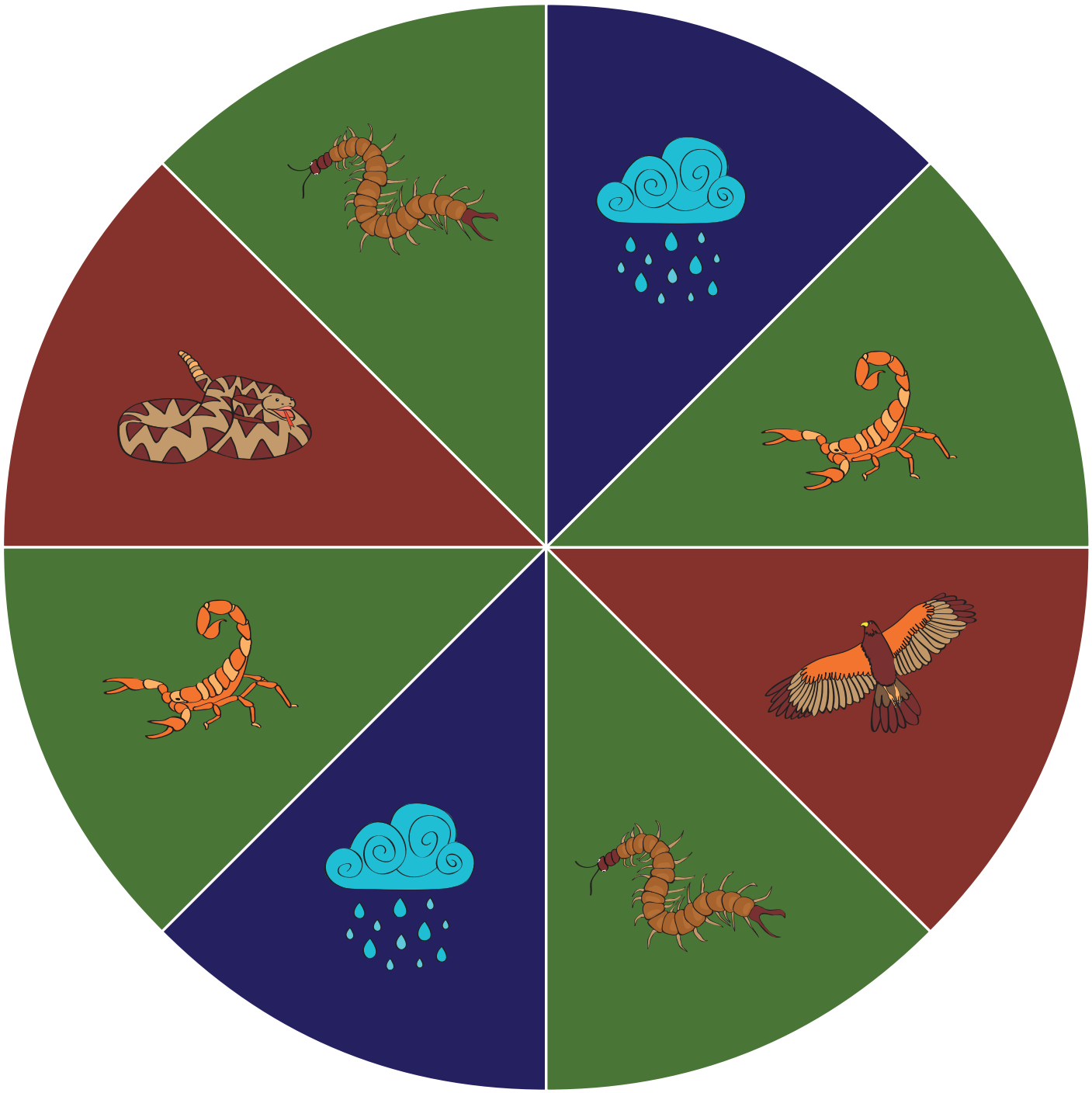
Extensions: After students have completed their cartoons, let them take turns acting out the stories they created about the chipmunk or mouse. Students can also write a short narrative to explain their cartoon.

Modifications: Instead of creating independent cartoons, give students an opportunity to re-tell the story of either the chipmunk or the mouse that they watched in the film. Encourage students to act out the role of their chosen animal as they recall the events in the film.

TEMPERATE FOREST ECOSYSTEM SPINNER



SONORAN DESERT ECOSYSTEM SPINNER



A DAY IN THE LIFE OF _____

Name: _____

First...	Then...	Last...

A DAY IN THE LIFE OF _____

Name: _____

First...	Then...	Last...

BIODIVERSITY SURVEY

ACTIVITY DESCRIPTION

Students will take a survey of the different organisms in their local ecosystem by closely observing plants and animals in a nearby outdoor space. Students will then create a bar graph to represent the results of their survey.

GUIDING QUESTION

What kinds of **organisms** contribute to the **biodiversity** of a local **ecosystem**?

OBJECTIVE

Students will understand the meaning of biodiversity by observing the species that contribute to the biodiversity of their local ecosystem. Students will survey local wildlife and analyze their data in a bar graph.

STANDARDS

Next Generation Science Standards

Disciplinary Core Idea LS4.D: Biodiversity and Humans

There are many different kinds of living things in any area, and they exist in different places on land and in water.

Crosscutting Concept: Systems and system models.

Science and Engineering Practice: Using Mathematics and Computational Reasoning

Common Core State Standards For Mathematics

2.MD.10: Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in the bar graph.

3.MD.3: Draw a scaled picture graph, and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how may more" and "how many less" problems using information presented in scaled bar graphs.

APPROXIMATE TIME

60 minutes

MATERIALS

- 1 copy of the **Biodiversity Rapid Inventory Recording Sheet** (page 17) per student group
- 1 copy of the **Rapid Inventory Bar Graph** (page 17) per student
- Colored pencils or crayons for coloring bar graphs (optional)

KEY VOCABULARY TERMS

biodiversity, ecosystem, organism, rapid inventory

BACKGROUND

In this exploration, students will conduct a rapid inventory to observe the biodiversity in their local ecosystem and record the results in a bar graph.

MATERIALS PREPARATION

Make 5 copies of the **Biodiversity Rapid Inventory Recording Sheet** (or one per group of students) Make 1 copy of the **Rapid Inventory Bar Graph** per student

PROCEDURES

ENGAGE

1. Explain that every healthy **ecosystem** has **biodiversity**, meaning that there are many different **organisms** that live in the same **ecosystem**.
2. In pairs, allow students to discuss the different types of plants and animals they think live in their schoolyard or backyard.
3. As a whole class, encourage students to share out some of the organisms they predict live in their local **ecosystem** and record these responses on the board.

INVESTIGATE

1. Explain that students will have an opportunity to observe the **biodiversity** in their own **ecosystem** by using a process called **rapid inventory**; this process is used by scientists to quickly record all of the **organisms** that live in a condensed area to give them a snapshot of the area's **biodiversity**.
2. Break students into five groups. Give each group of students a copy of the **Rapid Inventory Recording Sheet**. From the list of **organisms** on the board that students predicted in the **"Engage"** process, instruct students to write down additional plants or animals that are not already listed on the recording sheet.
3. Assign each group a number that corresponds with one of the pre-written organisms. Each group will be responsible for counting how many of this type of organism they see. If students have additional time, all groups can look for the organisms that were added additionally in order to practice observational skills.
4. Allow students to choose roles within each group, including one recorder to mark how many organisms are observed, and explorers who will communicate to the recorder when they see an organism.
5. In the schoolyard or neighborhood, allow students to explore in their groups and have the recorder use tally marks to keep track of the total number of organisms seen by the group.

REFLECT AND SHARE

1. Back in the classroom, ask each group to report how many organisms they saw from their assigned category. Record the total numbers of each of the five assigned organisms on the board.
2. Explain that a bar graph is a way to display data so that it can be viewed and analyzed easily.
3. Give each student a copy of the blank **Rapid Inventory Bar Graph**.
4. Model how to record data on the bar graph by using one of the groups' data to draw an example on the board.
5. Instruct students to draw the remaining four bars on their graph in the same way, using the data collected by the other student groups. Students can color the bars different colors if they like.
6. Using the completed bar graphs, ask students to analyze their data by providing guiding questions such as: How many insects were observed? What was the total number of animals observed? How may more trees were observed than birds?

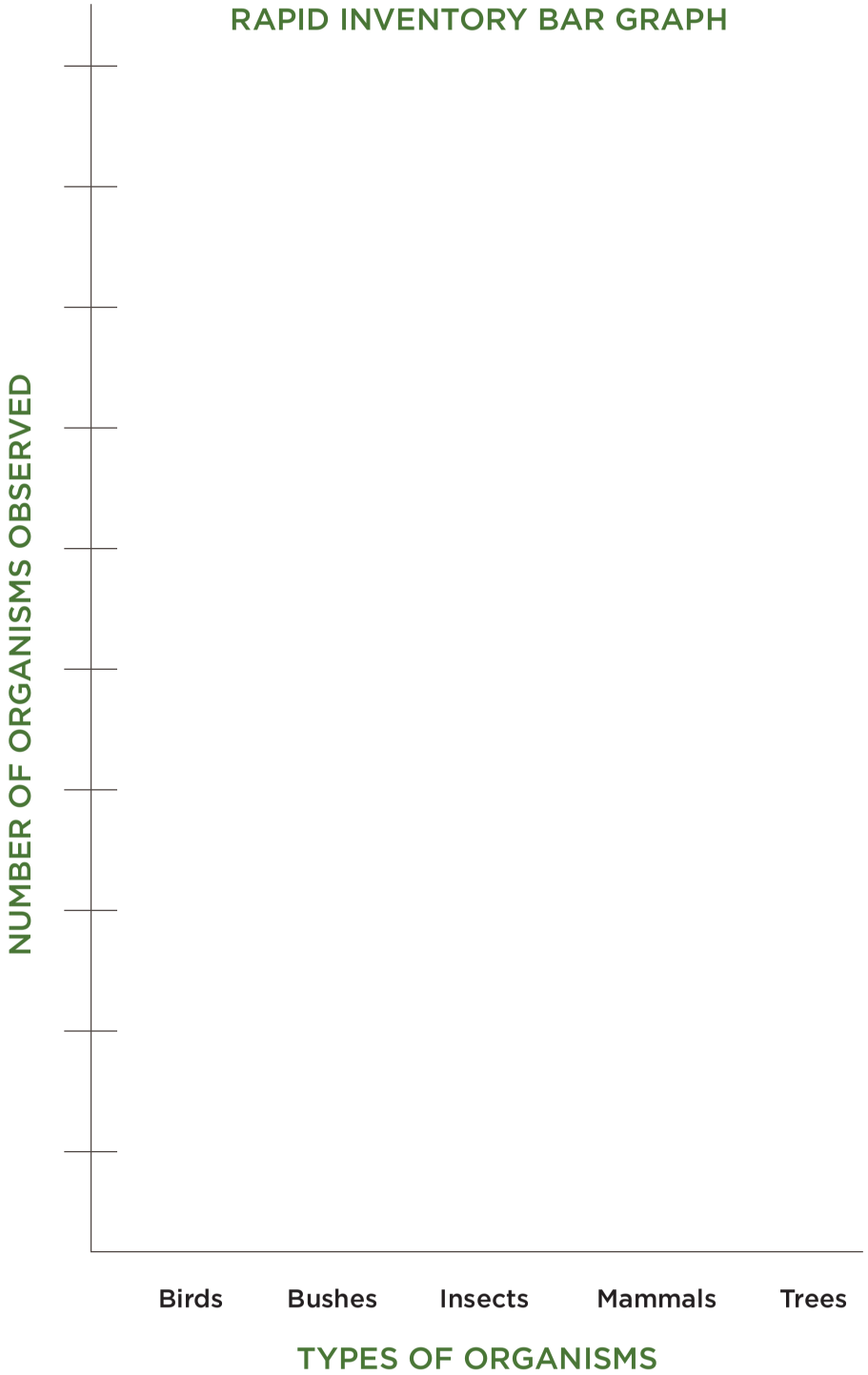
DIFFERENTIATION

Extensions: To make this activity more challenging, allow each group of students to collect data for multiple organisms. During bar graph construction, incorporate the three additional organisms that students generated at the beginning of the lesson.
Modifications: If it is not possible to bring students outside, allow them to look out of the window and record any plants or animals that they can see outside. To further scaffold the bar graph activity, students can work together in groups to create a bar graph, instead of constructing one independently.

RAPID INVENTORY RECORDING SHEET

Group Number	Type of Organisms	How Many? (Tally Marks)
1	Birds	
2	Bushes	
3	Insects	
4	Mammals	
5	Trees	
All Groups		
All Groups		
All Groups		

RAPID INVENTORY BAR GRAPH



BUILDING A BIODIVERSITY FIELD GUIDE

ACTIVITY DESCRIPTION

In this investigation, students will recall the variety of living things that they encountered in *Tiny Giants* and work collaboratively to create a field guide for either a desert or forest ecosystem.

GUIDING QUESTIONS

What kinds of organisms contribute to the **biodiversity** in a temperate forest or desert **ecosystem**?
How are different organisms connected in an **ecosystem**?

OBJECTIVE

Students will be able to recognize the variety of organisms that inhabit either a forest or desert ecosystem by closely watching *Tiny Giants*. By creating a field guide of organisms, students will determine the key characteristics of the plants and animals necessary to identify them.

STANDARDS

Next Generation Science Standards
Disciplinary Core Idea LS4.D: Biodiversity and Humans
There are many different kinds of living things in any area, and they exist in different places on land and in water.
Crosscutting Concept: Systems and system models
Science and Engineering Practice: Obtaining, evaluating, and communicating information

APPROXIMATE TIME

45 minutes

MATERIALS

- One front-and-back copy of the **Organism ID Card** (page 20) per student
- One front-and-back copy of the **Field Guide Cover Page** (page 20) per group of students
- Colored Pencils, markers, or other drawing supplies
- Hole punch
- String
- Sample field guide books or websites, such as http://www.allaboutbirds.org/guide/ and http://www.enature.com/fieldguides/ (optional)

KEY VOCABULARY TERMS

biodiversity, ecosystem, field guide, organism

BACKGROUND

In every place, there are many different species of organisms that contribute to the biodiversity of the ecosystem. Every species is important to maintain balance within that ecosystem. Field guides are books that contain images and clear descriptions of organisms. Field guides are resources used by scientists, students and amateurs to aid in species identification.

MATERIALS PREPARATION

Make copies of the **Organism ID Cards**. Distribute drawing supplies into piles for each group of students. Cut string into lengths of about 4 inches. Cut one piece of string per student group.

PROCEDURES

ENGAGE

1. Ask students to think about the plants and animals they saw in *Tiny Giants.* In pairs, allow students to tell each other about at least three animals or plants that they saw during the film. Make two lists on the board of the **organisms** from both the temperate forest and Sonoran Desert ecosystems shown in the film as students share out with the whole class.
2. Describe the purpose of a **field guide**. Tell students that they will be using the **organisms** they saw in *Tiny Giants* to create a field guide of the **biodiversity** of animals that live in a forest or desert **ecosystem**.

INVESTIGATE

1. Break students into groups of four. Within each group, have students decide on an **ecosystem** (Sonoran Desert or temperate forest). Allow each student in the group to choose a different animal within that ecosystem.
2. Give each student a copy of an **Organism ID Card**. Allow each student to name and illustrate their animal on the front of the card, and complete the additional information on the back.
3. Provide sample field guide books or websites for students to look at while they work.

REFLECT AND SHARE

1. In groups, encourage students to share the information that they recorded about their animal. Allow members of the group to provide feedback and suggest additional information that may be added to each card.
2. After revisions, direct students to design a front cover and create a table of contents page for their book. Tell students they can decide to arrange their organisms in any order they like, but they need to justify the way that they order the organisms—for example, they may arrange them by type of animal, location in the food chain, or alphabetically.
3. Stack the completed **Organism ID Cards** together and place the **Cover Page** on top of the cards. Punch a hole in the top left corner of the compiled pages and use the string to tie the pages together through the punched hole.
4. Allow groups to trade and review each others' finished field guides.

DIFFERENTIATION

Extensions: In the "other information" section on each animal card, encourage students to describe how the organism is connected to each of the three other organisms that were selected by other members in their group.
To increase the challenge level of this activity, allow each student to choose three or four organismsindependently to create their own biodiversity field guide.investigate
Modifications: Instead of breaking into groups, allow the whole class to decide on an ecosystem and create a field guide collectively. Allow students to work in pairs to draw and answer the questions about each organism. Collect the cards from each pair of students and make one field guide for the entire class.

FRONT OF ORGANISM ID CARD

Draw the organism below:

Organism name: _____

BACK OF ORGANISM ID CARD

Additional Information

Color(s):

_____

Food Source(s):

_____

Predators or Threats:

_____

Home (nest, burrow, cave, tree, etc.):

_____

Other Information:

_____

_____

_____

FRONT OF FIELD GUIDE COVER PAGE

Field Guide for a

_____

ecosystem

BACK OF FIELD GUIDE COVER PAGE

Table of Contents:

Organism 1: _____

Organism 2: _____

Organism 3: _____

Organism 4: _____

SPECIALIZED "SUPERPOWERS" FOR SURVIVAL

ACTIVITY DESCRIPTION

In this activity, students will consider the climate and environment of a desert or forest ecosystem. From this ecosystem, students will select an animal to closely examine and determine the physical and behavioral adaptations that make it well suited for its environment. Students will summarize their findings in a graphic organizer.

GUIDING QUESTIONS

What do animals need to survive? What special **adaptations** do animals have that allow them to obtain the things they need to survive in their **ecosystem**?

OBJECTIVE

Students will understand that animals have specific adaptations that allow them to survive in their ecosystem.

STANDARDS

Next Generation Science Standards
Disciplinary Core Idea LS1.A: Structure and Function
Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.
Disciplinary Core Idea LS1.D: Information Processing
Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain.
Animals are able to use their perceptions and memories to guide theiractions.
Crosscutting Concept: *Structure and function.* The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
Science and Engineering Practice: Analyzing and Interpreting Data

APPROXIMATE TIME

40 minutes

MATERIALS

- One copy of the **Specialized "Superpowers" for Survival Graphic Organizer** (page 23) per student
- Images of animals that live in a temperate forest (such as: eastern chipmunk, great horned owl, gray wolf, wood frog, garden snail, and North American moose) and animals that live in the Sonoran Desert (such as: grasshopper mouse, Harris hawk, Sonoran Desert tortoise, western diamond-backed rattlesnake, Tucsonblonde tarantula, desert hairy scorpion, and desert centipede)

KEY VOCABULARY TERMS

adaptation, behavior, ecosystem, venom, camouflage

BACKGROUND

In order to survive, all animals need strategies to access food, protect themselves from predators and weather, gather information, and move around. Animals have different ways of performing these actions that are well suited to the specific environment within their ecosystem.

MATERIALS PREPARATION

Copy and cut out the **Specialized "Superpowers" for Survival Graphic Organizers.** Copy images of animals or prepare them to show to students digitally, as in a powerpoint.

PROCEDURES

ENGAGE

1. Ask students if they have ever been to a forest or a desert. What did it look like? What did it feel like? If students have never been to one of these ecosystem, ask them what they imagine it would be like.
2. Ask students what kinds animals might live in a forest? What animals might live in a desert? Record these animals on the board in two lists—one for each **ecosystem**. After students have brainstormed, add animals that may have been overlooked from the forest (eastern chipmunk, great horned owl, gray wolf, North American moose, wood frog, garden snail) or desert (grasshopper mouse, Harris hawk, Sonoran Desert tortoise, western diamond-backed rattlesnake, Tucson blonde tarantula, desert hairy scorpion, and desert centipede) ecosystem.
3. Explain that in order to survive, all animals need a way to get food, protect themselves from predators and weather, move around, and gather information. Animals in different **ecosystems** may have different ways of doing these things because they have **adapted** to their environment, meaning that over time they have developed body parts or specific **behaviors** that allow them to survive in their unique ecosystem. Examples of specific **adaptations** include highly developed sight or hearing, **camouflage**, **venom**, immunity to venom, sharp claws, sensitive whiskers, and burrowing for the winter.

INVESTIGATE

1. Give each student a copy of the **Specialized "Superpowers" for Survival Graphic Organizer**. Have each student pick an animal that was recorded in the **Engage** section.
2. Instruct students to write the name of the animal and its **ecosystem**, and draw a picture of the animal in the center of the page.
3. Direct students to fold each corner of the graphic organizer toward the center along the gray line. Label the outside of each of the four flaps: "Moving", "Getting food", "Sensing and Communicating", and "Protecting".
4. Under each flap, tell students to list all the physical and behavioral adaptations that the animal uses to complete the action on the front of the flap.

Note: the following guiding questions can be used to help students complete the information for each category.

Getting Food	Moving	Sensing & Communicating	Protecting
What kinds of food does this animal eat? What do the animal's teeth or claws look like? Does the animal store its food for later? Can the animal grab objects with its paws?	Does the animal fly, hop, crawl, slither, or climb? Is the animal fast or slow?	Does the animal have large ears, nose, eyes, or whiskers? What sounds does this animal make? When does the animal make these sounds?	How does the animal build or find its home? Does the animal have sharp claws, teeth, scales, or venom? Does the animal have warm fur for the winter? Does the animal use camouflage to blend in with its environment?

REFLECT AND SHARE

1. In pairs, allow students to tell a partner about their animal's special "superpowers" that enable it to survive in its environment.
2. Display each student's graphic organizer around the room.
3. Encourage students to complete a gallery walk around the room to view each others' finished work

DIFFERENTIATION

Extensions: Ask students to imagine that their animal was suddenly placed in a different ecosystem of their choosing, such as rainforest, savanna, ocean, mountain, or tundra. Asks students to write a response to the following prompts: Would this animal be able to find food, protect itself, sense information, and move effectively in its new environment? How would this animal's specific adaptations and behaviors help or hinder it in its new environment?

Modifications: Break students into groups of four. Have each group collaboratively work to complete the graphic organizer for their chosen animal. Each member of the group can focus on one component of animal survival, and then share their ideas and receive feedback and suggestions from the group.

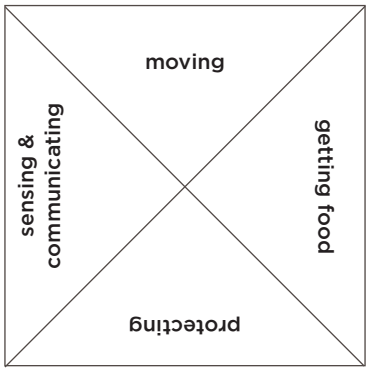
SPECIALIZED "SUPERPOWERS" FOR SURVIVAL GRAPHIC ORGANIZER

Animal's Name:

Draw your Animal:

Animal's Ecosystem:

The folded and labeled graphic organizer should look like the image below:



ADAPTATION DESIGN CHALLENGE

ACTIVITY DESCRIPTION

Students will apply their knowledge of animal adaptations to design and create a new species of animal that is well-suited to survive in a specific environment. After creating their highly adapted new species, students will label and describe the specific body parts and behaviors that make their animal well suited for its environment.

GUIDING QUESTION

What physical **adaptations** and **behaviors** allow animals to survive in unique **ecosystems**?

OBJECTIVE

Students will understand that animals have specific adaptations that allow them to survive in their ecosystem.

STANDARDS

Next Generation Science Standards

LS1.A: Structure and Function

Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

LS1.D: Information Processing

Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

Science and Engineering Practice: Analyzing and Interpreting Data

Crosscutting Concept: *Structure and function.* The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

APPROXIMATE TIME

40 minutes

MATERIALS

- One copy of the **Adaption Organizer** (page 26) per student
- One copy of the **Adaptation Design Challenge** (page 27) per student
- Colored pencils, crayons, or other drawing materials

KEY VOCABULARY TERMS

adaptation, behavior, camouflage, torpor, venom

BACKGROUND

The climate, weather, terrain, availability of food, and presence of predators all affect the survival of organisms in an ecosystem. Over time, animals have adapted specific body parts and behaviors to allow them to survive well in their environment.

MATERIALS PREPARATION

Make copies of the **Adaptation Organizer** and **Adaptation Design Challenge.** Gather drawing materials and separate them into groups so that students can access them around the room.

PROCEDURES

ENGAGE

1. Ask students to reflect on the different kinds of animals they saw in *Tiny Giants*. Compile a class list as students share out.
2. Think about what these animals need in order to survive. What kinds of dangers do these animals face? In the film, how did animals find food, avoid predators, move around, and endure the weather and climate of their environment?
3. Explain that over time **adaptations** in animals' physical features and **behaviors** allow them to meet their needs within their specific **ecosystem**. Call out specific **adaptations** evident in animals shown in *Tiny Giants*, such as **torpor**, **venom**, immunity to venom, **camouflage**, speed, feathers, fur, whiskers, and sharp claws.

INVESTIGATE

1. Give each student a copy of the **Adaptations Organizer.** As a whole class, brainstorm and list animal **adaptations**, both physical and behavioral, that help animals complete each of the actions in the four animal action categories. Students can draw from their knowledge of the animals in *Tiny Giants* in addition to their knowledge of other animals from different ecosystems.
2. From their experience watching *Tiny Giants*, prompt students to write a brief description of either a forest or desert including information such as local wildlife and climate. Encourage students to read their **ecosystem** descriptions out loud to a partner.
3. Tell students to pick either a desert or forest ecosystem and to use their **Adaptations Organizer** to pick and choose physical features and behaviors from each of the categories to combine and create a new species that would be able to survive in that ecosystem.
4. Give each student a copy of the **Adaptation Design Challenge** and allow students to use art supplies to draw their new animal species.

REFLECT AND SHARE

1. Allow students to create a name for their new animal species.
2. Tell students to label the different animal parts that are well-adapted for the environment and give a short description of what function that part serves in helping the animal survive.
3. Instruct students to answer the writing prompt below the picture of their new animal.
4. Display student work around the room and facilitate a gallery walk to allow students to view all of the new animal species and their adaptations.

DIFFERENTIATION

Extensions: Allow students to select a different **ecosystem** of their choice (savanna, rain forest, ocean, etc). Guide students through the process of researching the climate and other organisms that live in the chosen ecosystem. Based on their research, have students design a new species that has **adaptations** and **behaviors** to survive in the **ecosystem.**

Modifications: Break students into groups of five. Within each group, students should work together to design an animal that is well adapted to the group's chosen ecosystem. Students should pick roles within the group: one student each will be responsible for choosing the behaviors and adaptations related to protection, getting food, sensing and communicating information, and movement. The fifth student will be responsible for the creative design and integration of these adaptations, and will serve as the artist for the group. Allow students to work collaboratively in groups to answer the writing prompts.

ADAPTATION ORGANIZER

Animal Action	Adaptations & Behaviors
Getting Food	
Moving	
Protecting	
Sensing & Communicating Information	

ADAPTATION ORGANIZER

Animal Action	Adaptations & Behaviors
Getting Food	
Moving	
Protecting	
Sensing & Communicating Information	

Name: _____

ADAPTATION DESIGN CHALLENGE

Using at least one adaptation from each Animal Action category on the Adaptation Organizer, draw your new species in its ecosystem below. Label its adaptations.

The name of this new species is: _____

Describe how the animal uses its specialized body parts and behaviors to move, obtain food, sense information, communicate, and protect itself in its environment.

_____

_____

_____

_____

_____

_____

GLOSSARY

ADAPTATION: the process of change by which an organism or species becomes better suited to its environment

BAR GRAPH: a diagram in which the numerical values of variables are represented by the height of rectangles of equal width

BEHAVIOR: the way in which an animal acts in response to a particular situation or stimulus

BIODIVERSITY: the variety of life in the world or in a particular habitat or ecosystem

CAMOUFLAGE: coloration or patterns that help an animal to appear to blend in with its surroundings

CARNIVORE: an organism that gets energy by eating animals

CLIMATE: the weather conditions in an area in general or over a long period of time

ECOSYSTEM: all the living and nonliving things in a particular area

ENVIRONMENT: the conditions that surround someone or something

FIELD GUIDE: a book that helps to identify birds, plants, animals, rocks, or other organisms or objects

FOOD CHAIN: a way of organizing living things by what they eat

HABITAT: the place or environment where a plant or animal naturally lives

HERBIVORE: an organism that gets energy by eating plants

OMNIVORE: an organism that gets energy by eating both plants and animals

ORGANISM: an individual animal or plant

PREDATOR: an animal that naturally preys on others

PREY: an animal that is hunted by another for food

PRODUCER: an organism that gets energy from sunlight, water, and nutrients

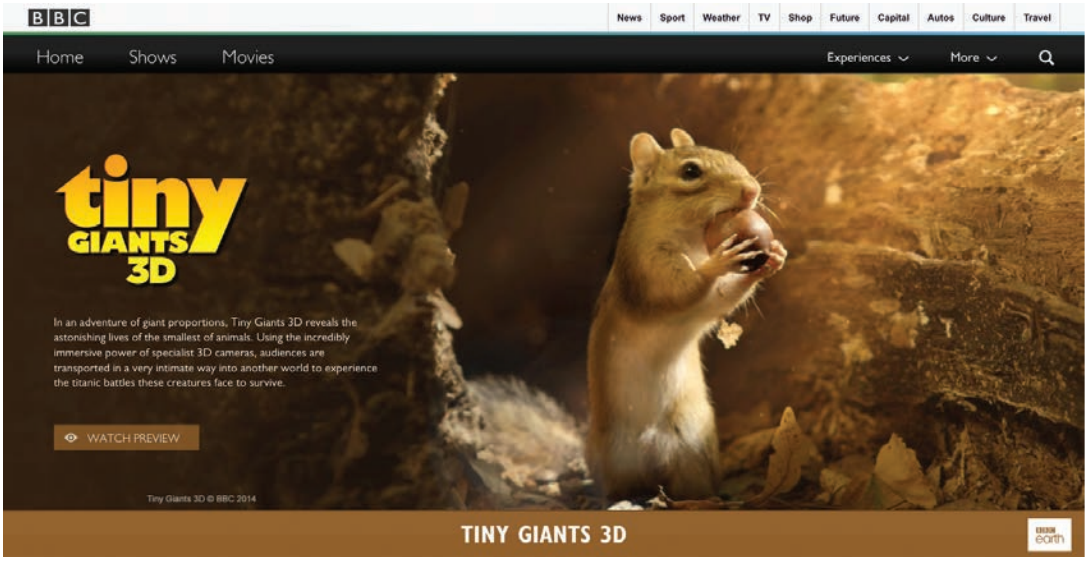
RAPID INVENTORY: a fast survey of the living things in a particular area

TORPOR: a short-term state of hibernation characterized by inactivity caused by lowered body temperature and slowed metabolism

VENOM: a poisonous substance secreted by animals such as snakes, spiders, and scorpions

OTHER TINY GIANTS ACTIVITIES YOUR CLASS WILL ENJOY

Visit our Tiny Giants website ***www.bbcearth.com/tinygiants*** to find a whole host of other activities that your class will enjoy. Please see examples of these below:



WEBISODES

In the following five 'Webisodes', Michael Gunton (writer and producer of *Tiny Giants*) takes us deeper into the world of our tiny giants whilst looking at some of the challenges involved in filming this adventure of giant proportions.

Nuts About Nuts: How does our heroic chipmunk survive the brutally harsh winters in North America? Michael Gunton, writer and producer of *Tiny Giants*, explains how awesome this tiny giant is at survival.

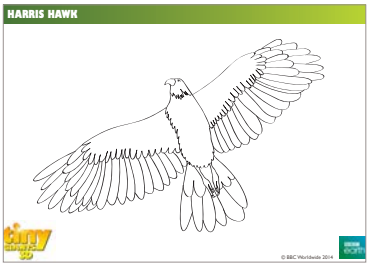
Scorpion Slayer: Are you a man or a mouse? Michael Gunton, writer and producer of *Tiny Giants*, tells us about our little hero the grasshopper mouse (commonly known as the scorpion mouse) and its remarkable ability to fight and hunt deadly scorpions!

Working In Miniature: Do you think filming *Tiny Giants* was a tiny or giant task? Michael Gunton, writer and producer of *Tiny Giants*, tells us about some of the technical challenges the team faced when filming the stars of our film.

LIVE CAMS OF CHIPMUNKS POWERED BY EXPLORE.ORG

KIDS ACTIVITIES

coloring in, dot-to-dot, word search



FOR MORE INFORMATION AND THEATRE LISTINGS, PLEASE VISIT

BBCEarth.com/TinyGiants

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BBC EARTH AND GIANT SCREEN FILMS PRESENT A BBC EARTH PRODUCTION *TINY GIANTS 3D* NARRATED BY STEPHEN FRY MUSIC COMPOSED BY BEN FOSTER
EXECUTIVE PRODUCERS AMANDA HILL NEIL NIGHTINGALE WRITTEN AND PRODUCED BY MARK BROWNLOW MICHAEL GUNTON DIRECTED BY MARK BROWNLOW


tiny
GIANTS
3D