Teacher Resources & Activities

Grades K to 8

PANDA RIDGE

San Diego Zoo Wildlife Explorers

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Welcome to Panda Ridge

For over 30 years, we've had the honor of working alongside our partners in China to make a difference for giant pandas. This species' inspiring conservation story is one of collaboration, innovation, and hope. These shared efforts have connected people across cultures and continents, showing how everyone can play a role in protecting wildlife.

One crucial partnership is our decades-long relationship with the China Wildlife Conservation Association. Remarkable progress has been made to save, protect, and care for giant pandas because we've united our strengths to make the greatest impact. After decades of collaborative conservation efforts, giant pandas were downlisted from Endangered to Vulnerable on the International Union for Conservation of Nature Red List of Threatened Species in 2016. Together we've made advances in long-term, sustainable solutions for pandas, including developing a specialized milk formula and neonatal care techniques that increased the survival of nursery-reared cub from less than 10% to over 90%. Additionally, reproductive research and field studies tracking pandas in native habitats, including the use of GPS tracking in China's Foping National Nature Reserve, have helped us learn more about how to protect pandas and the bamboo forests they rely on.

The newly reimagined Denny Sanford Panda Ridge at the San Diego Zoo is the beginning of an exciting new chapter in our commitment to giant panda conservation. The expanded and refreshed habitat draws inspiration from the lush, mountainous landscapes of pandas' native habitats in Sichuan, Gansu, and Shaanxi provinces in China. Since their arrival, Xin Bao and Yun Chuan have been thriving as they explore their expansive, dynamic ecosystems that also offer guests the opportunity to be immersed in their world.

This curriculum will take you on a remarkable journey through wildlife research, focusing on the skills scientists use to study and protect giant pandas and other wildlife in their native habitats. You'll learn about the tools, methods, and strategies researchers use to understand these species and how we can each help create a world where all life thrives. We hope that by joining us through this educational experience you're inspired to be a lifelong ally for wildlife.

Introduction to Giant Panda Research & Conservation

Our collaborative efforts to save and protect giant pandas are a powerful example of how scientific research and conservation are intertwined. Research provides the critical knowledge needed to understand panda behavior, health, genetics, and habitat needs. This information directly informs conservation actions such as native habitat restoration and reintroduction efforts. At the San Diego Zoo, our experts have gained critical insights to help shape real-world conservation solutions for pandas.

RESEARCH INITIATIVES

Our efforts have focused on increasing understanding of panda biology and behavior to enhance overall health as well as conservation breeding success. Notably, we pioneered using GPS satellite telemetry and remote field cameras to monitor pandas in their native range, providing insights into their mating behaviors, denning ecology, and the impacts of human wildlife coexistence. These studies have been crucial in developing effective management strategies for panda conservation.

CONSERVATION EFFORTS

Our conservation programs emphasize the “One Health” framework, recognizing that the health of wildlife, humans, and ecosystems are interconnected and dependent on one another. Over the last few decades, we’ve collaborated with our Chinese partners to develop neonatal care techniques that significantly increased cub survival rates. As we enter a new era of giant panda conservation, we’re applying the “One Health” approach to leverage innovative, cutting-edge technologies to address the most pressing challenges pandas face today and support the reintroduction of pandas into native habitat. Together we’re working toward a future for giant pandas with abundant, sustainable populations and fully flourishing bamboo forest ecosystems.

INTEGRATION OF RESEARCH AND CONSERVATION

The synergy between research and conservation is evident in our approach. Scientific findings directly inform conservation strategies, ensuring that efforts to protect pandas are grounded in the latest knowledge. This integrated approach has not only increased panda populations but also served as a model for conserving other vulnerable species.

By highlighting this relationship, we hope you and your students can explore how science is applied beyond the classroom and show how evidence-based research leads to meaningful environmental change.

About this Guide

This curriculum is designed to support students from kindergarten through 8th grade, with each lesson aligned to Next Generation Science Standards (NGSS). Each grade-level lesson introduces age-appropriate concepts related to conservation, wildlife, and environmental science, building on foundational knowledge as students progress through the years. The lessons are crafted to connect classroom learning with real-world applications, encouraging students to explore the natural world and understand the importance of conservation. By engaging students with hands-on activities, discussions, and investigations, this curriculum aims to inspire a lifelong interest in science and conservation while helping them meet key learning goals.

K

KINDERGARTEN

Nature's Needs

DRIVING QUESTION

Where do animals live, and why do they live there?

LEARNING OUTCOME

Students will create a pictograph to identify six organisms and their needs for survival.

NEXT GENERATION SCIENCE STANDARD

K-LS1-1. **Use observations to describe patterns of what plants and animals (including humans) need to survive.** [Clarification Statement: Examples of patterns could include that animals need to take in food, but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.]

K-ESS3-1. **Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.** [Clarification Statement: Examples of relationships could include that deer eat buds and leaves and therefore, they usually live in forested areas; and grasses need sunlight, so they often grow in meadows. Plants, animals, and their surroundings make up a system.]

VOCABULARY

Wildlife
Animals and plants in their environment.

Researcher
Someone who studies and discovers new things.

Habitat
The place where wildlife live or grow.

Survive
To continue living or existing, especially when there is danger.

Journal
Write down and note what you notice and what you learn.

Needs
The things you must have.

INTRODUCTION

Wildlife researchers study animals and plants and where they live, which is called their habitat. The more researchers know about animals, the better they are at helping animals survive. Researchers often keep journals to record information. A researcher's journal might contain numbers, stories, or even drawings of plants and animals. We're going to join wildlife researchers as we study six different wildlife found in the temperate forests of China—red panda, giant panda, takin, Mang Mountain pit viper, red-crowned crane, and bamboo—and what they need to survive.

Using the About Me cards, groups of students (3–4 students) will create their own pictograph comparing the needs of six living organisms, including sun, water, plants, or meat. Then students can discuss how their needs are similar and different from each other and themselves.

ACTIVITY

MATERIALS

About Me cards
for each organism

Blank Animal cards
(1 per group)

Need cards
(2 sets per group)

9" x 12" sheets of paper

1. **Introduce the concept:** Explain to the class that they are now wildlife researchers traveling to China to study six different animals and plants. As a class, they are trying to find out if each animal or plant can get what they need where they live.

2. **Divide students into teams:** Split the class into small groups of 3–4 students and distribute the About Me cards for each organism. Have students practice reading the cards and learning about each animal and plant.

3. **Prepare materials:** Using the provided boxes and crayons/markers/colored pencils, each person in the group will individually create and cut out symbols/images for:

   - **Six living organisms:** red panda, giant panda, takin, Mang Mountain pit viper, red-crowned crane, and bamboo.
   - **Needs:** sun, water, food (plant), food (meat).

4. **Organize by organism:** As a group, place a living organism in the center of the group's 9" x 12" colored sheet of paper and arrange its needs around it (one organism at a time, with their needs arranged around them).

5. **Organize by need:** As a group, put a need at the center and arrange around it the organisms that need it.

6. **Conclusion:** Have groups decide on their final arrangement for the pictograph. When finished, invite groups to do a gallery walk to see how everyone arranged their work.

K

K

Red panda

A red panda is about 2 feet long. That's about the size of **4 cellphones** next to each other.

Red pandas live in a **forest habitat of bamboo**.

Red pandas like to eat **bamboo**.

Red pandas eat **one leaf** at a time.

Sometimes they will eat foods like **insects** and bird **eggs**.

Like raccoons, red pandas dip their **paws** into **water** when needing a drink.

Giant panda

The Giant Panda is 2-3 feet tall.
That's about the same size as a **baseball bat**.

Giant Pandas live in a **forest habitat of bamboo**.

Giant Pandas mostly eat **bamboo**.

Sometimes they eat **grass, some insects, and fruit**.

Giant pandas drink water from **streams, pools, and puddles**.

Giant pandas are active **day and night**.

K

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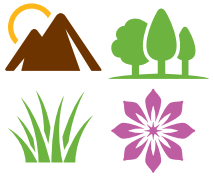
Takin

A takin is between 5.5 to 7 feet long.
That's about as long as a **refrigerator** is tall!



Takins live in the **mountains, some forests, and fields of grass and flowers** high in the mountains in Bhutan, China, parts of India, and Myanmar.

Takins like to eat **grasses, bamboo, shrubs, leaves and twigs**.

Takins drink **water from streams, pools, and puddles**.

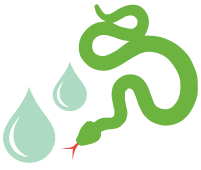
They are great **climbers**.

Mang mountain pit viper

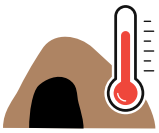
Mang Mountain pit vipers are about 7 feet long.
That's bigger than the average **bed**.

Mang Mountain pit vipers live in a **forest habitat of bamboo**.

Mang Mountain pit vipers like to eat **meat** like insects, frogs, and mammals.



Mang Mountain pit vipers **drink water** by using **sponge-like folds in their mouth** to soak up water when it's **raining**.



One way that the Mang Mountain pit vipers stay warm in the winter is by crawling deep into **caves**.

Red-crowned Crane: BobYue /iStock /Getty Images Plus

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Red-crowned crane

Red-crowned cranes are about 5 feet tall.
That's about the same size as the average **adult woman**.

Red-crowned cranes live in many habitats like **wetlands** or grassy fields.

Red-crowned cranes like to eat **meat** and **plants**, like fish, rodents, and grasses.

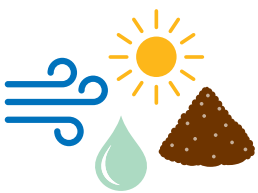
Red-crowned cranes drink water from **wetlands** and **streams**.

Red-crowned crane adults have a **large red patch on their head**.

Bamboo

Bamboo is the **fastest-growing plant** that grows on land.

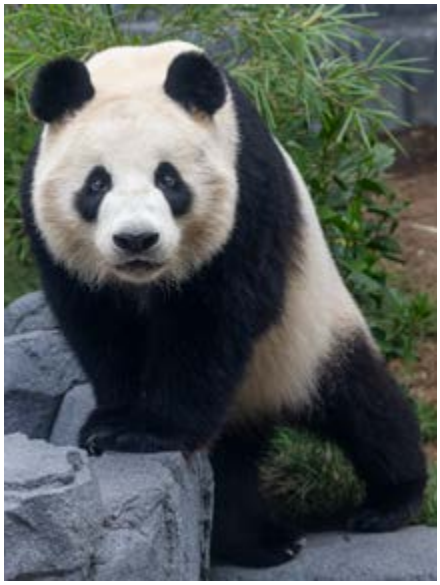
Bamboo can grow to up to 100 feet tall.
That's taller than a 7-story building!



Bamboo needs **air, light, water, and soil** to grow.

Nature's Needs

Red panda



Giant panda

Takin

Mang Mountain pit viper

Red-crowned crane

Bamboo

Red panda	**Giant panda**	**Takin**
Mang Mountain pit viper	**Red-crowned crane**	**Bamboo**

Sun	 **Water**	 **Plant**	 **Meat**
Sun	 **Water**	 **Plant**	 **Meat**

1ST GRADE

Who Do I Look Like?

DRIVING QUESTION

How are parents and their children similar and different?

LEARNING OUTCOME

Students will match pictures of babies to pictures of their parents and make observations about similarities and differences.

VOCABULARY

Inherit
To receive a body feature or behavior that is given from the parent to the baby.

Offspring
The baby or young of an animal or plant.

Trait
Something that makes a plant or animal different from others.

Variation
The changes or differences between different plants and animals.

NEXT GENERATION SCIENCE STANDARD

1-LS1-2. **Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.** [Clarification Statement: Examples of patterns in behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

1-LS3-1. **Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.** [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size, and a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance, or animals that undergo metamorphosis, or hybrids.]

INTRODUCTION

Plant, bird, mammal, and reptile parents provide important traits and information to their offspring. While the parents and offspring do not always look exactly the same, you can determine who everyone is related to by making detailed observations based on distinct features or behaviors parent and offspring have in common.

In this activity students will act as scientists asking questions and making observations to determine the traits of parent and offspring. Students will be able to see how behaviors of parents help support offspring and understand that young plants and animals are alike but not the same.

ACTIVITY

MATERIALS

"What do you see?"
Provided VTS image

Animal card set

Red Panda, parent
Red Panda, offspring

Giant Panda, parent
Giant Panda, offspring

Mang Mountain pit viper, parent

Mang Mountain pit viper, offspring

Red-Crowned Crane, parent
Red-Crowned Crane, offspring

Snow Leopard, parent
Snow Leopard, offspring

Bamboo, parent
Bamboo, offspring

Chinese Mountain Ash, parent
Chinese Mountain Ash, offspring

Takin, parent
Takin, offspring

1. **Warm up observation skills:** Display the provided visual thinking strategy (VTS) image to the class. Provide students time to look at the photo, then begin facilitating conversation.

2. **Ask open-ended questions such as:**
   - What do you see happening in this photo?
   - What are you noticing in this image?
   - What do you see that tells you that?
   - Where do you see that clue in this picture?
   - What more can we find?

3. **Review the vocabulary:** Ask students if they are able to identify the parent and offspring in the image. Ask students to take a closer look at the wildlife in the image. Have students work in teams and start identifying the similarities between the two featured animals.

4. **Note similarities:** On the board or a sheet of paper, keep track of where students noticed similarities.

5. **Observe variations:** Together, discuss variations and have students observe the differences between the parents and offspring.

6. **Pass out animal cards:** Place Animal matching cards out for groups of students to work together.

7. **Divide students into groups:** Have students work in groups to try and match the parents to their offspring using what they have learned about different traits that can be inherited and variation from parent to offspring.

8. **Conclusion:** After groups have completed matching the parent and offspring, lead the group in discussion. Have students share the matches their groups made and why they matched them.

   - Ask students what clue they used to help them connect the two related individuals.
   - What features on one of your parent/offspring matches were the most similar?
   - Which matches were the most challenging? Why?

Who Do I Look Like?

Parent Animal card set

Katusura Tree: gyro/ iStock/ Getty Images Plus

Offspring Animal card set

Red-Crowned Crane Offspring: Jupiterimages /PHOTOS.com/Getty Images Plus
Snow Leopard Offspring: gnagel /iStock /Getty Images Plus
Bamboo shoots growing in the bamboo grove: Yata /iStock/ Getty Images Plus
Katusura Branch with Buds: RobsonPL/ iStock/ Getty Images Plus

2ND GRADE

Nature's Tiny Travelers

DRIVING QUESTION

How do animals help plants grow?

LEARNING OUTCOME

Students will explore how seed structures enable dispersal with the help of animals. Students create a model of a giant panda and test how far different seed models can travel.

VOCABULARY

Plant
Living things that use sunlight to make their own food; they usually include leaves, stems, roots, and either flowers or cones.

Disperse
To spread through a large area.

Model
An example to show how something works or looks.

Pollinate
To move or carry pollen from one plant to another to help make new plants.

Animal dispersal
The process of animals helping move and spread seeds through a large area.

NEXT GENERATION SCIENCE STANDARD

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

DCI LS2.A Plants depend on animals for pollination or to move their seeds around.

INTRODUCTION

In the bamboo forest where giant pandas, snow leopards, and takins live, there are many different types of plants, like mountain ash, birch, rhododendron, and orchids. All of these plants thrive on light, water, and the soil they live in, but to make new plants they sometimes need a little help.

Some plants get help from pollinators who help carry their pollen from plant to plant. Other plants depend on animals to help them carry their seeds to new places. These animals play an important role in helping plants spread to new areas. Animals like giant pandas, snow leopards, and takins help spread plant seeds, making it possible for new plants to grow.

There are many different kinds of seeds, each built with special structures that help them spread throughout their habitat, including structures that help them stick to and move on and through animals! In pairs, students will explore different seed structures in addition to developing and testing a model to see how the design of the seed's structures help the seed attach and move with animals.

ACTIVITY

MATERIALS

"Nature's Tiny Travelers" handout

Example photos of seeds being dispersed by animals

Example photo of seeds attached to an animals

Cotton balls

Cardboard

Construction paper

Glue

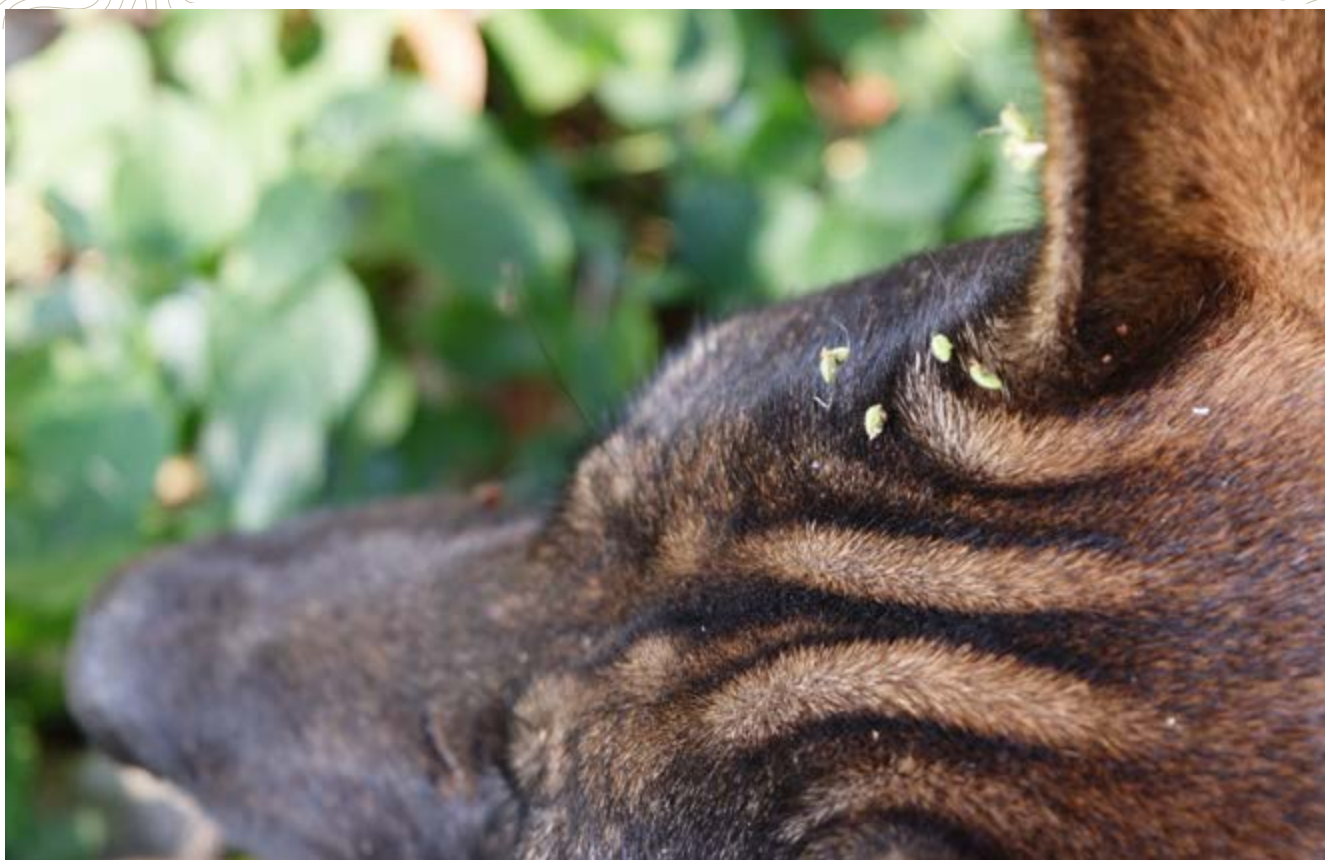
Tape

Toothpicks

PREP

- Print provided handout.
- Using cotton balls, create one "animal fur" sample for students to test their seed's ability to attach. If cotton balls are unavailable, you may use felt or something equally as textured.

1. **Investigate seed types:** Look at different types of seeds and notice the structures on them using the provided images of different seeds. Share how these structures are important to helping seeds attach to animals.
2. **Provide an example:** Show sample photo of an animal with seeds on its fur and liken it to VELCRO. Explain the importance of animals in helping new plants grow by spreading seeds.
3. **Introduce activity:** "Let's test out different seed structures to see what "sticks." This is called a model, which is what scientists use to study things that aren't around them. Today we're going to design a model of a seed to see what structures might best help a seed attach to an animal and be carried to a new place. For our model we will be using our class sample of "animal fur," and each of you will test how well your seed attaches to it."
4. **Divide students into pairs:** Put students in pairs and pass out the handout to help guide the creation of their model, collect information from their test, and strategize modifications to make their seeds.
5. **Provide materials:** Set out a variety of materials that students can use to create a seed.
6. **Design model:** Have teams work together to design a seed they think will successfully "stick" to the animal model.
7. **Create model one:** Partners will work together to think of what structures and materials they want on their seed and fill out provided handout.
8. **Test model one:** Once teams have created their seed, they can go up to the animal model and attempt to stick the seed on the animal.
   - Teams have two attempts with their seed model to try to attach the seed.
   - Have partners record on their handout what happened during each attempt.
9. **Brainstorm improvements:** After running the test once, have students go back and create a second model they think will be even better.
   - Guiding questions for creating model two:
     - What worked well on your first seed?
     - What do you think you want to add?
     - Did anything make it harder for your seed to attach?
10. **Modify seed models:** Have groups work to adjust their model and fill out the handout again for model two.
11. **Test model two:** Invite groups up to test out their newly modeled seed to see if it attaches and record their observations on the bottom half of their handout.
12. **Conclusion:** Wrap up the activity with a group discussion.



Small green plant seeds on a dog's head - stock photo: Anant_Kasetsinsombut/ iStock/ Getty Images Plus

Example photos of seeds being dispersed by animals

Using cotton balls, create one "animal fur" sample

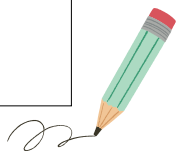
Nature's Tiny Travelers

Model 1

What material will you use?

- _____
- _____
- _____
- _____
- _____
- _____

What do you want it to look like?



What do you think will happen?

_____

What happened?
circle what happened for each trial

TRIAL 1:

Sticky success!

How long did it stick? _____

It fell off

TRIAL 2:

Sticky success!

How long did it stick? _____

It fell off

Model 2

What material will you use?

- _____
- _____
- _____
- _____
- _____
- _____

What do you want it to look like?

What do you think will happen?

_____

What happened?
circle what happened for each trial

TRIAL 1:

Sticky success!

How long did it stick? _____

It fell off

TRIAL 2:

Sticky success!

How long did it stick? _____

It fell off

3RD GRADE

The Cycle of Life

DRIVING QUESTION

Do all animals start as eggs?

LEARNING OUTCOME

Students will use videos, articles, and research notes to create a diorama and poster comparing and contrasting the life cycles of different animals.

NEXT GENERATION SCIENCE STANDARD

3-LS1-1. **Develop models to describe how organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.** [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

VOCABULARY

Life cycle
A series of stages a living thing goes through during its life.

Research
A way to learn new things by asking questions, gathering information, and finding answers through careful study.

Diorama
A small 3D model that shows a detailed picture of something, often using figures and objects.

INTRODUCTION

Life cycles show how living things grow, change, and reproduce during their lives. For example, a butterfly starts as an egg, then turns into a caterpillar, then a chrysalis, and finally an adult butterfly! Studying life cycles helps us understand how plants and animals develop and survive in nature. It also helps us know how to be an ally for wildlife.

How do wildlife researchers study the life cycle of an animal or plant? They might study an adult animal and watch its behavior, writing down what it does and where it goes. They may also look for clues such as eggs, nests, or young. While all animals and plants have similarities in their life cycle, there are differences, too. As scientists, you're going to study six different animals and plants to explore their life cycles! You'll observe how each animal and plant grows and changes, and then look for similarities and differences between them. Do they all start as eggs? Do they all go through the same stages? Your job will be to investigate these questions and discover what makes each animal and plant unique. Get ready to explore and think like a scientist!

ACTIVITY

MATERIALS

Research notes organizer

Red panda article, fact sheet

Giant panda article, fact sheet

Takin article, fact sheet

Mang Mountain pit viper article, fact sheet

Red-crowned crane article, fact sheet

Bamboo article, research guide

Diorama template and instructions

Cardstock or printer paper

Recycled and/or found materials (paper, sticks, leaves, flowers, etc.)

Glue sticks

Scissors

Markers and other writing supplies

Compare and contrast activity handout

1. **Lead class discussion:** Have pictures of each animal and plant up on the board. As a class, discuss the similarities and differences between them.
2. **Introduce the activity:** Read the text located under "Introduction" to the class.
3. **Divide students into teams:** Place students into 6 teams of equal size.
4. **Assign organisms:** Assign one animal or plant to each team.
5. **Facilitate student research:** Using books or the online resources provided, students will research the life cycle of their animal or plant and fill in their research notes organizer.
6. **Create model:** Using recycled or available materials, students will use the diorama template to create a model of their animal or plant's life cycle.
7. **Partner groups and present:** When finished, two teams with different plants or animals partner up and present their dioramas to each other.
8. **Compare and contrast**: Have the two teams work together to create a "compare and contrast" graphic organizer.
9. **Facilitate class discussion:** Discuss the differences and similarities they found in their groups. Add the information to the initial class discussion in step one.
10. **Conclusion:** Summarize for students how animals and plants have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.

The Cycle of Life

Research Notes

TEAM NAME: _____

TYPE OF ORGANISM

Bird Amphibian Fish Plant

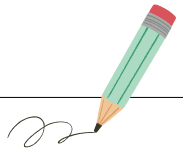
Mammal Reptile Invertebrate

HOW IS IT BORN?

Seed Egg Live Birth

GROWTH - HOW STAGES DOES IT HAVE?

WHAT DOES THE HABITAT LOOK LIKE?



3RD

3RD

3RD

Red-crowned Crane: BobYue /iStock /Getty Images Plus

How To Make A Diorama

Use these instructions after students have completed their research and understand how many stages are in their animal's life cycle. If there are more stages, students may wish to create a second diorama.

Each group will need one printable template per life cycle stage.

Use notes on the organisms habitat to decorate the 4 background panels to match the animal's habitat.

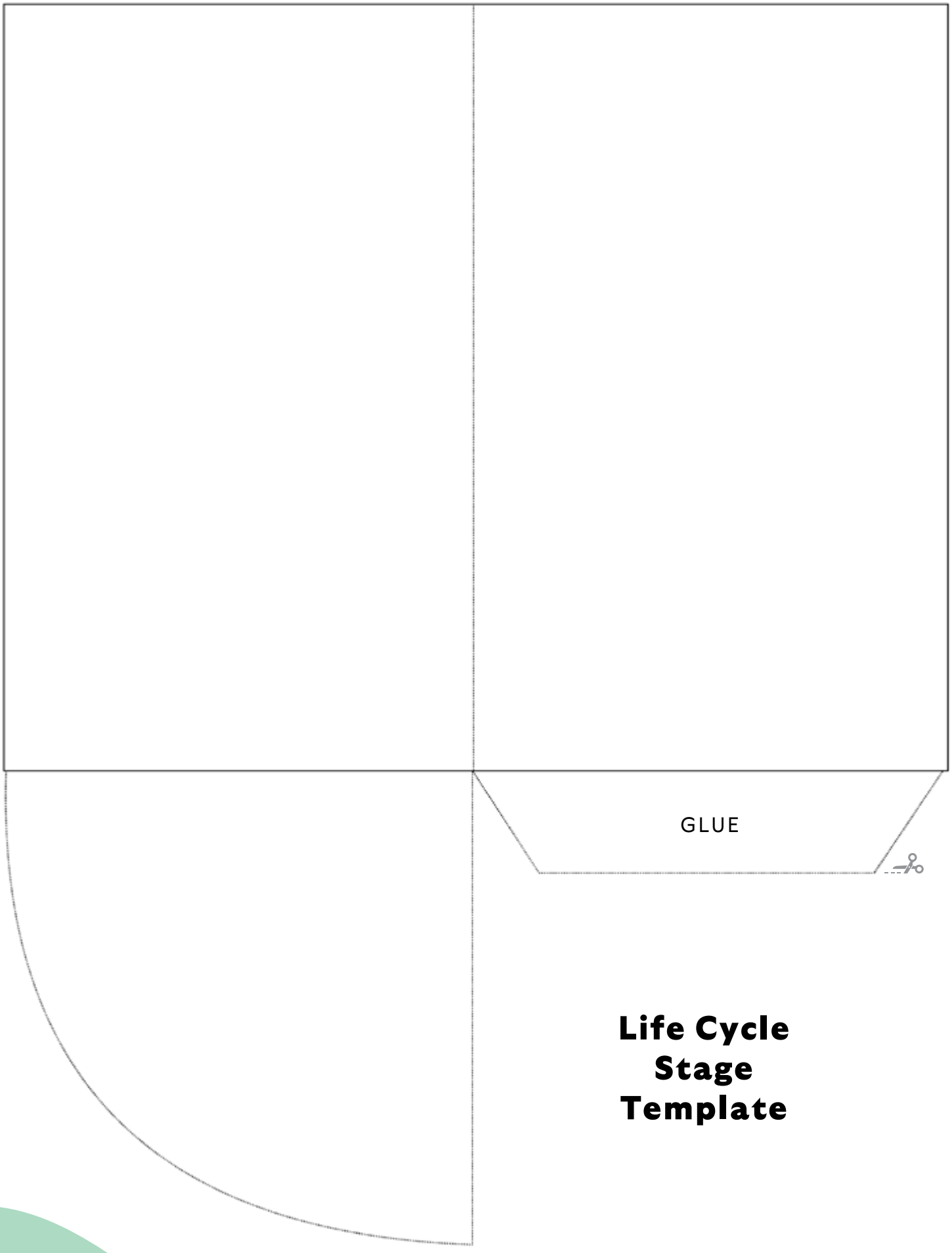
Cut out each of the panels and fold along the dotted lines.

Apply glue on the area marked with the word "glue" and stick under the base. Repeat until all four are finished.

Attach the panels by applying glue to the rectangles and sticking them together.

Begin creating a model version of each stage. 1 stage per section.

Have students label their stages and think about how they want to present their diorama to their partner team.



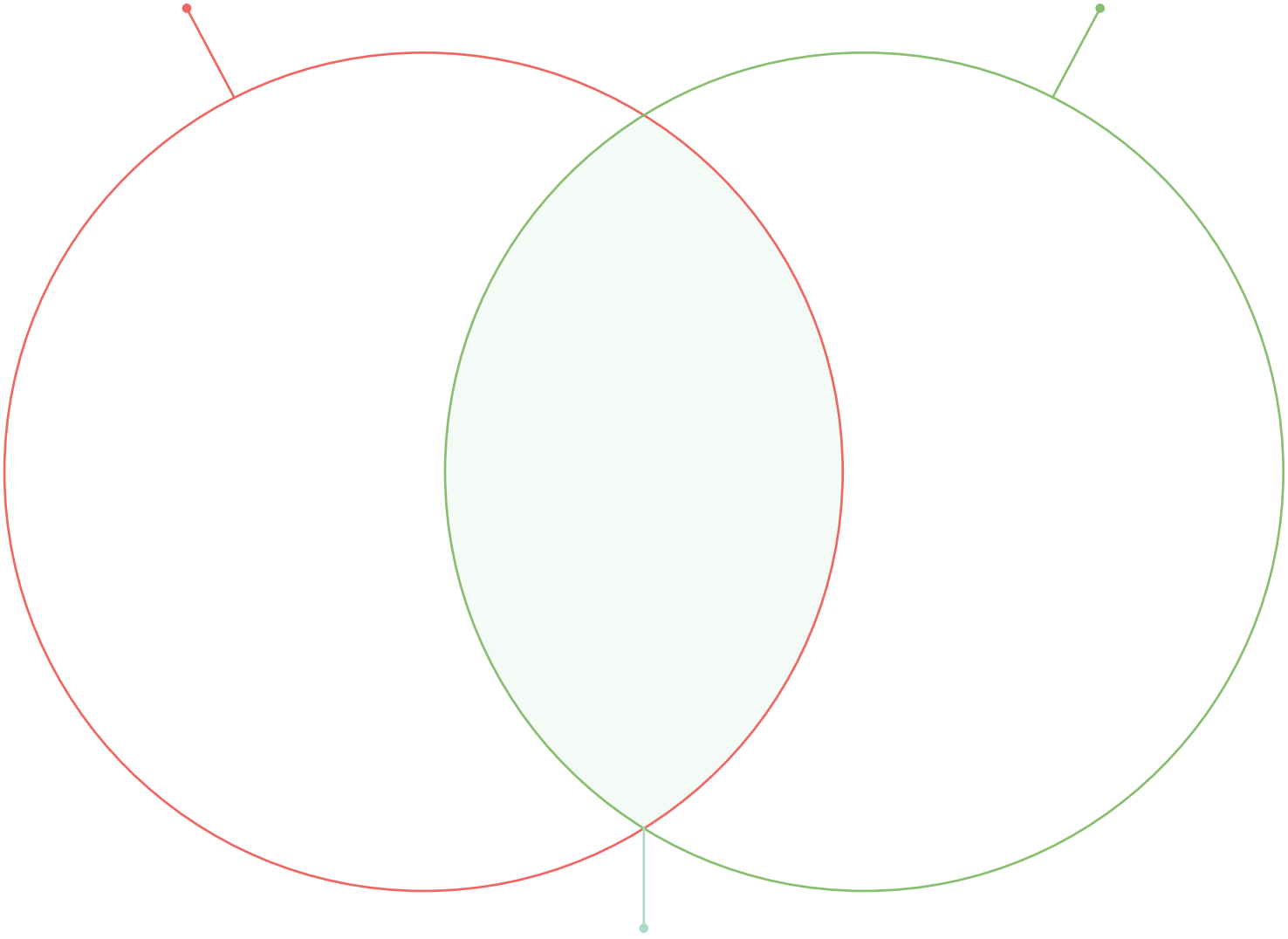
Life Cycle Stage Template

Compare and Contrast

NAME: _____ CLASS: _____

Write similarities and differences to compare and contrast the two animals.

Organism:_____ **Organism:**_____



Similarities

4TH GRADE

Adaptation Observation

DRIVING QUESTION

How do the different structures of animals help them survive, grow, behave, and reproduce?

LEARNING OUTCOME

Students study and identify behavioral and physical adaptations of red pandas, giant pandas, takins, and Mang Mountain pit vipers.

NEXT GENERATION SCIENCE STANDARD

4-LS1-1. **Construct an argument that animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** [Clarification Statement: Examples of structures could include heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within animal systems.]

VOCABULARY

Adaptation
A body part, body covering, or behavior that helps a living thing survive in an environment.

Hypothesis
A suggested idea based on a small amount of evidence that serves as a starting point for further exploration.

INTRODUCTION

Animals have adaptations that help them survive. An adaptation can be physical or behavioral. A body part or physical trait that helps an animal survive is a physical adaptation. Think about a panda's teeth, takin's shaggy fur coat, or viper's cryptic coloration. A behavioral adaptation would be something that an animal does. A giant panda's solitary lifestyle and the dance of the red-crowned crane are examples of behavioral adaptations.

In this activity, students will study animals and observe their adaptations. Using those observations, students will make hypotheses on how they might help the animal survive, grow, behave, or reproduce.

ACTIVITY

MATERIALS

Pictures of students' pets and/or favorite animals

Teacher guide

Adaptations Field Log worksheets

Pencils (one per student)

Animal videos
red panda
giant panda
takin
Mang Mountain pit viper

1. **Introduce the concept:** Ask students to bring in pictures of their pet or a favorite animal, or supply an animal picture to each student or student group.
2. **Define terms:** Draw two columns on the board, one for behavioral adaptations and one for physical adaptations. Define these terms and give examples. Ask students to describe the adaptations of their animals. Have the class decide if each adaptation is behavioral or physical and write it in the correct column.
3. **Distribute:** Pass out the Adaptations Field Log worksheets.
4. **Introduce the challenge:** Tell the students that you received field camera footage, and you need their help identifying the animal and its adaptations. Watch each video twice so students have time to process what they are seeing.
5. **Watch the video:** Have students use their field log to note any physical adaptations or behavioral adaptations.
6. **Discuss:** Work together as a class or in small groups to share notes and come up with a list of adaptations for each animal. As the teacher, you can use the teacher guide to help lead students toward the listed adaptations.
7. **Divide students into pairs:** Once you have your list, have students break up into pairs and come up with a hypothesis for how the adaptation might help the animal survive.
8. **Conclusion:** Discuss as a class and confirm the validity of each hypothesis using the teacher guide.

Adaptation Observation

Teacher Guide

Fur color	Camouflage among red moss and white lichen
Claws	Climbing, defending territory, protection
Tail	Scent marking where they walk to deter predators, keep warm when weather gets cold
Flat teeth	Adapted for chewing bamboo stalks and leaves
Grooming	Prefer to keep clean like cats

Fur color	Many hypotheses, with one being camouflage
Coarse hair	Repels water
Large canines	Help to eat bamboo, very strong jaws
Rubbing	Scent marking for communication
Climbing	Find food and safety
Claws	Grip for climbing and handling bamboo stems

Sandy color	Lightens as they age, so calves have better protection
Short hair	Helps to stay cool
Horns	Knock down trees for food or for protection/to fight
Split hooves	Leap from rock to rock
Large nose	Warm up the air they breathe before it gets to the lungs
Pushing	Known to use their powerful bodies to push over small trees to bring those leaves closer

Coloring	Excellent camouflage for protection
Tongue	Smells the air with their tongue to see what's nearby
Coiled up	Use the "sit-and-wait" technique to hunt food
Mouth	Opens wider than their body in order to swallow their prey whole

Adaptation Observation

Researcher Field Log

	What do you notice about the animal's physical adaptations?	What do you notice about the animal's behaviors?
		
		
		
		

5TH GRADE

Map It Out!

DRIVING QUESTION

How can humans mitigate the impact they've had on wildlife and their habitats?

LEARNING OUTCOME

Students investigate how scientists use evidence like scat, scent marks, and hair to learn about an animal's range and habitat needs. Students discover that habitat fragmentation is detrimental to breeding populations because animals cannot find each other to breed and that conservation scientists generate possible solutions to help wildlife survive and thrive.

NEXT GENERATION SCIENCE STANDARD

3-5-ETS1-2. 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.

INTRODUCTION

Students practice graphing skills to map out clues to giant panda occurrences through evidence left behind that could include scat, scent marks, and hair. Using this information, they identify the animals' home range and recommend two locations for human-made hollow trees that will provide much-needed den habitat for vulnerable pandas.

VOCABULARY

Scat
Solid body waste left by animals; a scientific word for "poop."

Scent mark
When an animal leaves its smell in a spot to mark territory or communicate with other animals, whether with urine or a specialized scent gland.

VOCABULARY

Den
A shelter or hidden space where animals live, rest, or raise their young, offering protection from weather and predators.

DNA
Deoxyribonucleic acid, a special code inside almost every living thing that tells the body how to grow, develop, and function.

Hollow
Having an empty space inside something solid.

MATERIALS

News bulletin from lead scientist

Map It Handout

Pen or pencil

Colored pencils or crayons

ACTIVITY

1. **Introduce the activity:** Have students read the following news bulletin and underline any words that are unfamiliar.
2. **Review vocabulary:** Discuss any unfamiliar words as a class before continuing.
3. **Graph locations:** Have students use the map to graph the location of the panda evidence the field researchers found.
4. **Locate home ranges:** Discuss in small groups where the female and male home ranges might be. Then circle the female panda home ranges.
5. **Conclusion:** Have students discuss with a partner where they think two human-made dens should be placed and explain why.

EXTENSION ACTIVITY

Using graph paper, students create their own maps of their outdoor play area. Invite them to include items similar to those in their panda map, like scat, tracks, plant locations, etc.

NEWS BULLETIN

Did you know scientists can learn a lot about animals just by studying things like their scat, scent marks, and even their hair?

These clues tell us where animals live and what they need in their habitats to survive. But what happens when habitats get broken up? It can be hard for animals to find each other to breed, which can lower their populations.

Luckily, conservation scientists are coming up with solutions to help. They're finding ways to make sure animals can survive and thrive, even when their habitats are fragmented. In fact, recent field studies show that giant panda mothers depend on good quality dens to raise their young. The problem is, there may not be enough of those to go around. Why? Pandas like to den in big, old, hollow trees, but much of the old-growth forest they rely on has been logged. Our field researchers have worked hard to find pandas here in the cloud forest, but no luck so far.

Instead, they've found several signs of pandas. We need your help to map out all the signs they've uncovered and use this information to plan the best places for our human-made dens. Our dens are fitted with monitoring cameras. Hopefully we can have them placed early in the spring so the females will choose to use them in August, when cubs are due. We've attached the list of information below. Thanks for all your help!

Photo courtesy of Zhang Zejun

Use the key and the coordinates given below to place each of the following on the map.

- Find the river. Color it **blue.** This is the fresh water resource for this region.
- Find the farmland. Color it **yellow.** This land was once old-growth forest that was logged and leveled for agriculture. It's no longer usable for the pandas.
- Find the bamboo stands. Color them **green.** This is panda habitat and food.
- Find the highway. Color it **black.** Humans need this road for transportation, but it cuts through panda habitat, limiting movement.
- Find the bridge. Color it **red.** This allows the highway to go over the river. It also provides a passageway for pandas to move from one side of the highway to the other.

We found scat here:
(2,5) (3,3) (5,5) (6,1) (9,2) (11,13) (13,10) (15,9)

We found scent marks here:
(3,4) (7,6) (8,7) (11,12) (12,14) (15,3) (15,13)

We found "chewed on" bamboo here:
(4,5) (5,4) (9,11) (14,15)

We found footprints here:
(7,5) (11,14) (12,5) (14,11)

We found panda hair here:
(3,5) (10,6) (11,1) (12,13) (15,11)

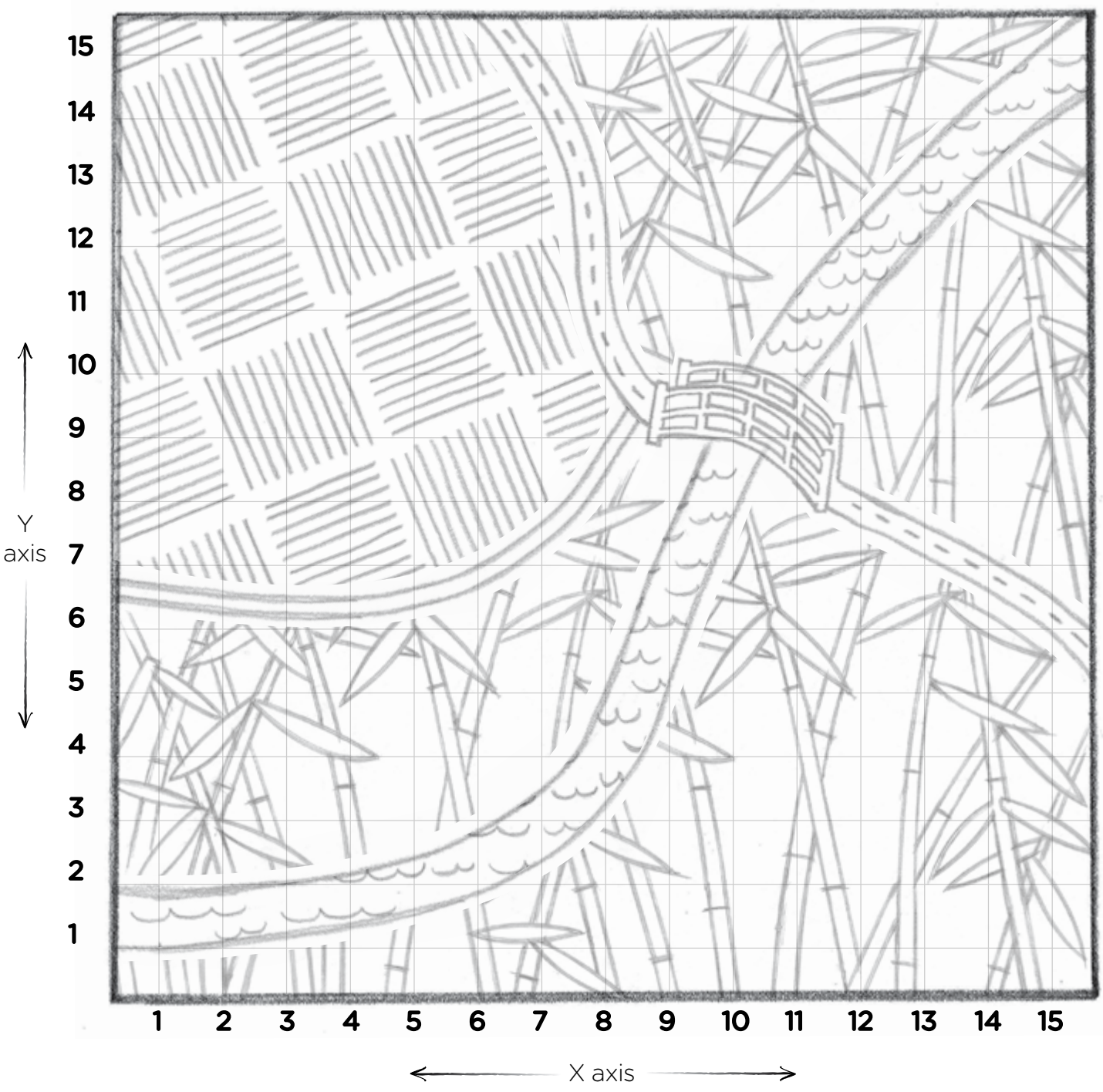
We also found two old-growth hollow trees, which are potential den sites, at:
(6,4) and (13, 14).

- DNA extracted from the hair found at (12,13) matches DNA found in the scat and scent mark samples also found in this region.This DNA belongs to Female A. **Circle** this panda's home range.
- DNA extracted from the hair found at (3,5) matches DNA found in the scat and scent mark samples also found in this region. This DNA belongs to Female B. **Circle** this panda's home range.
- DNA extracted from hair samples at (10,6) and (11,1) belong to the same panda, Male C. **Circle** this panda's home range and do not overlap the females' home ranges.

- Where would you place two human-made dens? Place them on the map. Explain your location choice.

Map It Out!

Map It Out!



SCAT | HAIR | SCENT MARKS | "CHEWED ON" BAMBOO | FOOTPRINTS | HOLLOW TREE | HUMAN-MADE DEN

6TH GRADE

Eco-Influencers

DRIVING QUESTION

How can we spark excitement in people to make a difference?

LEARNING OUTCOME

Students become conservation influencers by working in teams to create a persuasive visual design that inspires others to act to minimize a human impact on the environment.

NEXT GENERATION SCIENCE STANDARD

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

VOCABULARY

Human impact
The changes that humans cause in the environment and on the planet, including things like pollution, deforestation, and climate change.

Influence
The ability to affect or change how someone thinks, feels, or behaves. It can come from a person's actions, words, or ideas, and can make others adopt new beliefs, make decisions, or act in certain ways.

VISUAL AND PERFORMING ARTS STANDARD

VA:Cr1.1.6a Combine concepts collaboratively to generate innovative ideas for creating art.

VA:Cr1.2.6a Formulate an artistic investigation of personally relevant content for creating art.

VA:Cr3.1.6a Reflect on whether personal artwork conveys the intended meaning and revise accordingly.

INTRODUCTION

China is home to over a billion people, and just like the United States, they have constructed roads, homes, cities, and farms. They also mine, harvest trees, and use other natural resources as we do. As a result, giant pandas' range shrank as trees were removed in logging operations and land was cleared for farming. Between 1974 and 1985 alone, suitable panda habitat decreased by 50 percent

due to human activities. However, thanks to the efforts of people who cared deeply and inspired others to take action, we have seen a positive increase in available habitat for giant pandas.

In fact, China's Natural Forest Conservation Program, implemented in 1997, provides protection to all remaining forests throughout the panda's range, which covers about 5.7 million acres (2.3 million hectares). The program banned logging in most forests in panda habitat, slowing habitat degradation. Additionally, the government has implemented policies like the Grain-to-Green program, which gives grain and cash subsidies to farmers who abandon farming on steep slopes and replant these areas as natural forests and grasslands. Consequently, panda habitat is recovering, and the total occupied habitat has increased by 11.8 percent. We really can make a difference!

In the American Southwest, people have also impacted the environment through sprawling development and habitat loss, air and water pollution, and water use. In groups, students will choose an impact that is important to them, research and select a feasible solution, and apply persuasive elements to a visual design to create an influencer campaign.

VOCABULARY

Persuasion
Using reasons, facts, and emotions to make a strong case for your ideas, hoping others will agree with you or take action based on what you say.

Logos
A way of convincing people by using logic and reason.

Pathos
A way of convincing people by appealing to their emotions.

Ethos
A way of convincing people by showing that you are trustworthy and have good character.

Sprawl development
When neighborhoods and buildings spread out over a large area, often outside of the city, which affects native habitats by taking up space that plants and animals need to live.

Habitat loss
The reduction in the amount of space where a particular species lives.

Pollution
Contaminants that are added to the natural environment and cause negative changes.

ACTIVITY

1. **Watch the following video:** Kids need recess, Simon Link, TEDxAmanaAcademy
2. **Introduce the concept:** Begin by engaging students in personal reflection about a change they would like to see in the world, big or small.
3. **Connect the influencers:** Help students bridge the activity title to the idea that we are all influencers, and we can decide what kind of influence we want to have on others. Students will be creating their own influencer campaign for Instagram.
4. **Divide students into teams:** Have each team choose one human impact in their area they would like to research and use as the topic of their influencer campaign.
5. **Draft questions:** Using the Question Formulation Technique, generate 4–5 questions that will be the focus of your influencer campaign. Divide up the questions among group members and begin researching answers for each. Students should keep track of sources.

MATERIALS

Computers

Access to Canva
(free for teachers and students)
• Can create as art pieces if Canva is unavailable

Notebooks to track ideas, research, and feedback

6. **Share findings with the team:** Have students use the Does It Fit? reflection protocol as a guide for their discussion.

7. **Discuss rhetorical appeals:** Show a campaign example of each. Have students guess which appeal was used and give evidence to support their answers.
   - Logos is a rhetorical appeal to the audience's logic and rationality (example)
   - Pathos appeals to the emotions and ideals of the audience (example)
   - Ethos refers to the character, credibility, and moral values a group or individual has (example)

8. **Choose an appeal:** Have teams choose which appeal they'd like to use for their campaign and begin brainstorming ideas for the campaign.

9. **Provide peer feedback:** Have groups pair off to provide feedback for their ideas using the "Praise, Question, Suggestion" protocol. Teams should come back together and discuss what they heard.

10. **Draft a campaign:** Teams should work together to draft a design campaign in Canva that includes the following:
    - A carousel post with a minimum of four photos that utilizes one of the rhetorical appeals
    - An action step
    - A caption to accompany the post
    - If wanting to use a different medium, students may work together to sketch out their carousel using the template provided

11. **Extension:** As time allows, students may be interested in researching topics such as graphic design and storytelling in addition to their issue and potential action steps.

12. **Provide peer feedback:** As time allows, teams should present their ideas to each other, utilizing critique protocols for giving and receiving quality feedback. After each session, allow time for teams to implement any necessary changes and repeat the process. For guidance on how to provide feedback, we recommend having students watch Austin's Butterfly: Models, Critique, and Descriptive Feedback.

13. **Display to the public:** Display graphics in the hallways with arguments posted, similar to an art gallery.
    - Optional: Share campaign designs and arguments as a social media campaign on the school's account.

14. **Conclusion:** Discuss the project and process as a class using the I Used to Think . . . Now I Think . . . reflection protocol.

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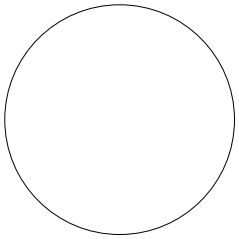

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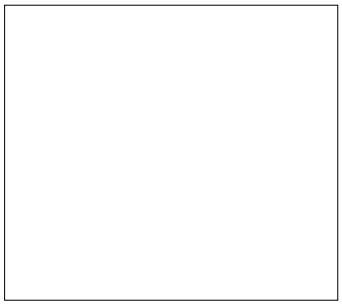

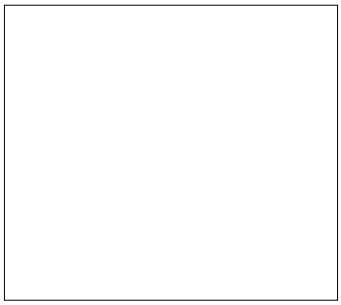

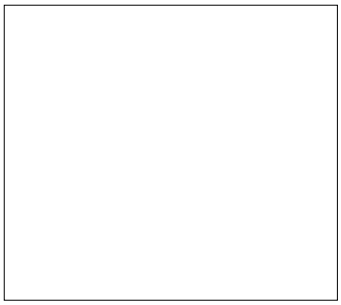

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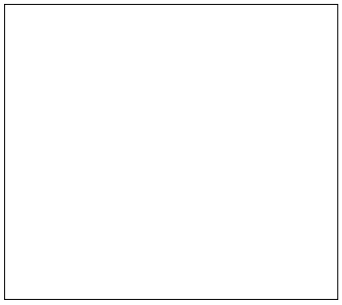
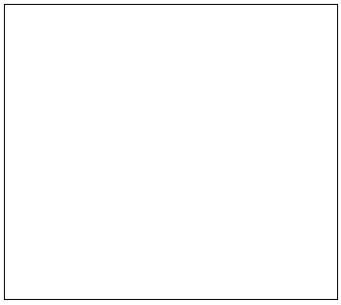
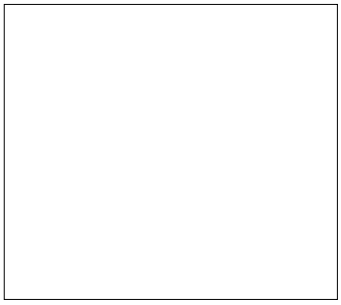






_____ _____ _____

_____ _____ _____

_____ _____ _____

7TH

GRADE

Thought Titans

DRIVING QUESTION

What should people consider when creating a solution to maintain biodiversity?

LEARNING OUTCOME

Within the bounds of a conservation issue, students will assume the role of debaters as they study different solutions used to maintain biodiversity throughout the world. Through their research, teams will choose and defend one solution to the class.

NEXT GENERATION SCIENCE STANDARD

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services. [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]

INTRODUCTION

Making an important decision is rarely simple. Many decisions that affect conservation are so hotly debated that teams of people must review them before policies can be established and action can be taken. Using the tools of research and debate, you will get the chance to share your ideas about the best ways to protect biodiversity within the guidelines of a particular conservation issue (for example, deforestation, endangered species protection, or habitat loss). Will everyone agree? How could learning about different opinions be helpful?

VOCABULARY

Debate
A discussion where people have different opinions about a topic and take turns sharing their ideas. Each side tries to explain why their opinion is the best, using facts and examples to support their arguments. The goal is to convince others, but it's also about listening and understanding different viewpoints.

Conservation
Protecting and taking care of nature, including animals, plants, and natural resources like water and forests, in order to prevent them from disappearing.

Deforestation
The act of clearing an area of trees.

Endangered
A plant or animal that is considered to be facing a very high risk of extinction in the world. In order to be classified as endangered, specific criteria must be met.

ACTIVITY

VOCABULARY

Habitat loss
A decrease in an area where a specific species, or group of species, can live and reproduce.

Biodiversity
The variety of life in the world or in a particular habitat or ecosystem.

Ecosystem
A community of living organisms (plants, animals, and microbes) in a particular area.

Evaluate
To determine the significance, worth, or condition of something or someone usually by careful appraisal and study.

MATERIALS

Access to research materials (online or books)

Debate Planner worksheet

Pencils

1. **Introduce the concept:** Begin with a class discussion on decision-making. Ask students to share examples of difficult decisions they've made or heard about, especially in situations where people had different opinions. Then explain how conservation decisions, like protecting biodiversity, often involve multiple viewpoints.
2. **Explain biodiversity and its importance:** Show a short video about biodiversity and why it matters for the health of ecosystems. Follow up with a discussion where students identify different forms of biodiversity (for example, species, habitats, or genetic diversity) and conservation issues related to human impact.
3. **Introduce the debate topic:** Explain that students will research and debate potential solutions to this issue to help maintain biodiversity.
4. **Divide students into teams:** Divide students into two or more teams. Each team will research a different solution or perspective on the issue. You may also assign specific roles within each team (for example, researcher, presenter, notetaker).
5. **Research:** Allow students time to research their assigned perspective. Provide them with resources (websites, articles, books) or direct them to credible sources. Remind students to gather both facts and examples that support their position on maintaining biodiversity.
6. **Prepare arguments:** Have each team organize their findings and decide on the main points they want to present in their argument. They should also consider potential counterarguments from the other teams.
7. **Hold the debate:** Have each team present their arguments to the class. After all teams have spoken, allow time for rebuttals, where students respond to opposing viewpoints.
8. **Reflect and discuss:** Lead a class discussion reflecting on what was learned. Ask questions like:
    a. What did you learn from hearing different viewpoints?
    b. How might understanding opposing perspectives help in making important decisions about conservation?
9. **Evaluate solutions:** Have students work in small groups to evaluate the solutions presented during the debate. They should consider the pros and cons of each, then decide which solution they think would be most effective for protecting biodiversity.
10. **Conclusion:** Wrap up the activity by discussing how similar processes are used in the real world to make policies about conservation. Encourage students to think about how they can continue to take part in protecting biodiversity in their own lives.

Debate Planner

Group Participants

Topic

Argument	Supporting Evidence
"I think _____ is the best solution."	"This solution works best because..."

Debate Planner

Potential Counterargument

"While it's true that _____."

Supporting Evidence

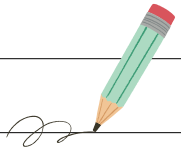
"Our solution is better because _____."

"Some people might say _____."

"But we believe _____ because _____."

Closing Statement

"In conclusion, our solution is the best because _____, _____, and _____.
After looking at all sides, it's clear that _____ is the most effective option because _____."



8TH

GRADE

Panda Podcast

DRIVING QUESTION

What would be the most effective method(s) to further the continued success of giant panda conservation today?

LEARNING OUTCOME

Students become content creators by creating a podcast episode that informs and advocates for conservation action that maintains and builds on the success of giant panda conservation. Students will create a persuasive argument that inspires and challenges others to make meaningful changes in the area the podcast host believes will be most effective in protecting giant pandas.

NEXT GENERATION SCIENCE STANDARD

MS-LS2-1. Ecosystems: Interactions, Energy, and Dynamics Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

MS-LS1-4. From Molecules to Organisms: Structures and Processes Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.

INTRODUCTION

The misty forests of southwestern China are home to incredibly diverse plants and animals, with perhaps the most well-known species being giant pandas. The formally widespread population of giant pandas is now restricted to six mountain ranges at the western edge of their former range.

Despite the conservation crisis and challenges facing giant pandas, major steps in the protection of the species have been made through partnerships, protection, and policies.

In 2016, giant pandas were downlisted from Endangered to Vulnerable on the International Union for Conservation of Nature Red List of Threatened Species. This was due in large part to the collaborative efforts of researchers, scientists, officials, and advocates.

Many of the most impactful steps taken to protect giant pandas have focused on addressing habitat loss, advancing scientific research and reproduction success, and reducing bamboo shortages. With these advancements in giant panda conservation in mind, students will create a podcast advocating and arguing for the steps they believe will be most impactful in protecting giant pandas and their habitat for future generations.

MATERIALS

Panda Podcast research guide

Panda Podcast outline

Research tools [Giant panda overview and fact sheet]

Computer

Optional: audio recording supplies

ACTIVITY

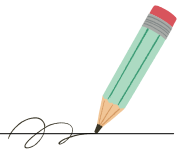
1. **Divide students into pairs:** Have students get into pairs or a small group
2. **Facilitate student research:** As a team, students conduct research into giant panda conservation. This might include:
   - What caused their numbers to decrease?
   - What policies or protections were put into place to protect them?
   - What strategies were used to increase their numbers (for example, addressing habitat loss, reproduction, reducing bamboo shortages, etc.)?
   - Are there other ideas that haven't been tried yet?
3. **Develop arguments:** Based on research collected, students should develop their own argument for what the next steps should be to further the conservation of giant pandas.
4. **Draft outline:** Using the Panda Podcast outline, have students draft their podcast outline.
5. **Record and share:** (with parents, on a platform, etc.). Possible platforms to record include:
   - Anchor
   - Audacity
   - WeVideo
   - Soundtrap
   - Garageband
6. **Conclusion:** Conclude activity with a group discussion, reminding students to be specific, helpful, and kind. The following are possible guiding questions:
   - What went really well?
   - What were the strengths of the project?
   - What surprised you?
   - If you had access to unlimited funding, what would you expand your show to include?
   - What challenges came up when planning your podcast?
   - How did you support each other as a team?
   - How might you overcome a challenge differently next time?
   - What was the most interesting thing you learned during your research?

8TH

Panda Podcast Research

Instructions: Use this guide to help you organize your research notes.

Group Name



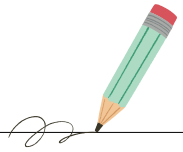
Background Information: Where is this animal found? What is their habitat like?

The Issue: What has happened to them? What is causing this issue?

Panda Podcast Research

Taking Action: What policies or protections were put into place to protect them?
What strategies have been used to help increase their numbers? Are there other ideas that haven't been tried yet?

Looking Forward: What does your group think scientist should do to further the conservation of giant pandas?
Use Claim-Evidence-Reasoning (CER) sentences to share.



CER Example: "I think we should use _____ because it is the best solution (claim). Experts say that _____, which supports this idea (evidence). This shows that _____, so our solution would be more effective (reasoning).

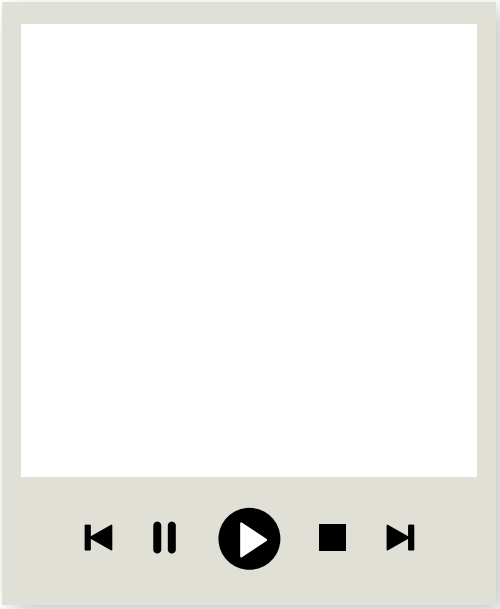
8TH

Panda Podcast Outline

Host

Podcast Name

Episode Name



Outline

Introduction

Who are you?

What are you going to be talking about?

Personal Argument

What steps/practices would work best to help protect the future of pandas?

Evidence

How would this step/practice help pandas?

Interview Questions

Develop two interview questions you would want a guest expert on your show to answer.

Conclusion & Sign Off

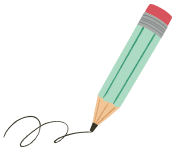
Panda Podcast Outline

Research

What did you learn?

Resources

What resources would you want to make your podcast?



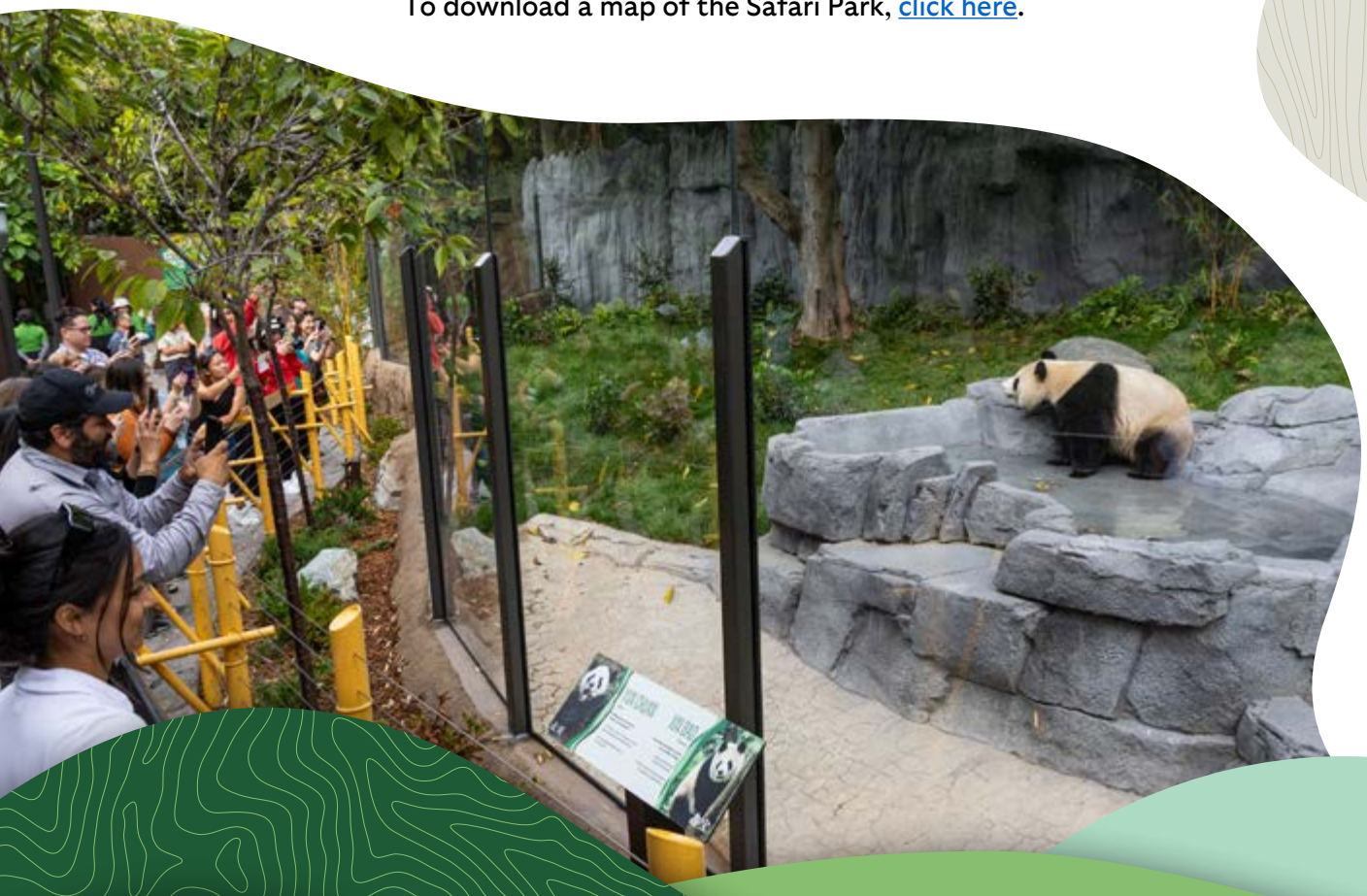
Online Resources

To learn more about giant pandas and the other wildlife at the San Diego Zoo and San Diego Zoo Safari Park, visit these online resources:

- https://animals.sandiegozoo.org/animals
- https://animals.sandiegozoo.org/plants
- https://ielc.libguides.com/sdzg/factsheets/index

To download a map of the Zoo, click here.

To download a map of the Safari Park, click here.



Glossary

A

Adaptation
A body part, body covering, or behavior that helps a living thing survive in an environment.

Animal dispersal
The process of animals helping move and spread seeds through a large area.

B

Biodiversity
The variety of life in the world or in a particular habitat or ecosystem.

C

Conservation
Protecting and taking care of nature, including animals, plants, and natural resources like water and forests, in order to prevent them from disappearing.

D

Debate
A discussion where people have different opinions about a topic and take turns sharing their ideas. Each side tries to explain why their opinion is the best, using facts and examples to support their arguments. The goal is to convince others, but it's also about listening and understanding different viewpoints.

Deforestation
The act of clearing an area of trees

Den
A shelter or hidden space where animals live, rest, or raise their young, offering protection from weather and predators.

Disperse
To spread through a large area.

DNA
Deoxyribonucleic acid, a special code inside almost every living thing that tells the body how to grow, develop, and function.

E

Ecosystem
A community of living organisms (plants, animals, and microbes) in a particular area.

Endangered
A plant or animal that is considered to be facing a very high risk of extinction in the world. In order to be classified as endangered, specific criteria must be met.

Ethos
A way of convincing people by showing that you are trustworthy and have good character.

Evaluate
To determine the significance, worth, or condition of something or someone usually by careful appraisal and study.

H

Habitat loss (6th Grade)
The reduction in the amount of space where a particular species lives.

Habitat loss (7th Grade)
A decrease in an area where a specific species, or group of species, can live and reproduce.

Habitat
The place where wildlife live or grow.

Hollow
Having an empty space inside something solid.

Human impact
The changes that humans cause in the environment and on the planet, including things like pollution, deforestation, and climate change.

Hypothesis
A suggested idea based on a small amount of evidence that serves as a starting point for further exploration.

Glossary

I

Influence
The ability to affect or change how someone thinks, feels, or behaves. It can come from a person's actions, words, or ideas, and can make others adopt new beliefs, make decisions, or act in certain ways.

Inherit
To receive a body feature or behavior that is given from the parent to the baby.

J

Journal
Write down and note what you notice and what you learn.

L

Logos
A way of convincing people by using logic and reason.

M

Model
An example to show how something works or looks.

N

Needs
The things you must have to survive.

O

Offspring
The baby or young of an animal or plant.

P

Pathos
A way of convincing people by appealing to their emotions.

Persuasion
Using reasons, facts, and emotions to make a strong case for your ideas, hoping others will agree with you or take action based on what you say.

Plant
Living things that use sunlight to make their own food; they usually include leaves, stems, roots, and either flowers or cones.

Pollinate
To move or carry pollen from one plant to another to help make new plants.

Pollution
Contaminants that are added to the natural environment and cause negative changes.

R

Researcher
Someone who studies and discovers new things.

S

Scat
Solid body waste left by animals; a scientific word for "poop."

Scent mark
When an animal leaves its smell in a spot to mark territory or communicate with other animals, whether with urine or a specialized scent gland.

Sprawl development
When neighborhoods and buildings spread out over a large area, often outside of the city, which affects native habitats by taking up space that plants and animals need to live.

Survive
To continue living or existing, especially when there is danger.

T

Trait
Something that makes a plant or animal different from others.

V

Variation
The changes or differences between different plants and animals.

W

Wildlife
Animals and plants in their environment.

Reference Material Links

1st Grade

"What do you see?" Provided VTS image

3rd Grade

Red panda article, fact sheet
Giant panda article, fact sheet
Takin article, fact sheet
Mang Mountain pit viper article, fact sheet
Red-crowned crane article, fact sheet
Bamboo article, research guide

4th Grade

Animal videos:
red panda
giant panda
takin
Mang Mountain pit viper

6th Grade

Kids need recess, Simon Link,
TEDxAmanaAcademy
Question Formulation Technique
Does It Fit?
Logos (example)
Pathos (example)
Ethos (example)
"Praise, Question, Suggestion"
Canva
Austin's Butterfly: Models, Critique, and
Descriptive Feedback.
I used to Think . . . Now I Think . . .

7th Grade

Research

8th Grade

Giant panda overview and fact sheet

San Diego Zoo
Wildlife
Explorers