

A close-up photograph of a tiger's face, showing its intense yellow eyes with black pupils, dark stripes on a light brown coat, and long white whiskers. The tiger is looking directly at the viewer.

# SAN DIEGO ZOO KIDS

**WILD CATS**  
Teacher Resources & Activities  
GRADES K TO 5



**SNOW LEOPARD**

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## ● ABOUT THESE ACTIVITIES

- The activities in this booklet follow the 5E Instructional Model developed through the Biological Sciences Curriculum Study (BSCS). The phases of the BSCS 5E teaching sequence are Engage, Explore, Explain, Elaborate, and Evaluate. Generally, activity steps 1 through 5 align with these phases.

*These materials are made possible by the William Randolph Hearst Foundation.*

# WELCOME FROM ZOOKEEPER RICK SCHWARTZ



## *Diego the ocelot*

I first met Diego the ocelot when he was just a small kitten, and although he was small, cute, and fluffy, he was all wild cat. Diego was born at another zoo and came to us at a very young age. His situation made him a good candidate to join our ambassador animals for education programs. That means we spend a lot of time working with him, so that he becomes accustomed to helping us teach people of all ages about ocelots and the habitats where they live. When Diego comes to a presentation with us, we can talk about his camouflage, large feet, the white spots on the back of his ears, and many more adaptations—and everyone can see them in person!

- One thing students frequently ask is, “How did we domesticate Diego?” This comes up because Diego does well walking on a leash and working with his trainers. The truth is, he’s not domesticated at all. Although Diego has been trained to work with his professional trainers, he still has all of his wild cat instincts. In contrast, domestication occurs over thousands of years when people selectively breed animals for specific looks or behaviors.

Working with cats like Diego, I often hear people say, “He acts just like my cat!” But the truth is, your domestic cat at home acts like Diego and other wild cats, not the other way around. This is because wild cats are the ancestors of domestic cats.

And although domestic cats have been bred to live with people, they still retain some of the wild cat behaviors from their ancestors. In fact, if you have a domestic cat at home, you may recognize certain behaviors like stalking, pouncing, and even grooming in the big cats, as well.



## CARING FOR CATS

There are 37 *species* of cats in the family Felidae, with only seven placed in the subfamily Pantherinae. Commonly referred to as the “big cats,” these animals include lions, tigers, leopards, jaguars, snow leopards, and clouded leopards.

Many big cats are in danger of disappearing from their wild habitats. Threats to their well-being include loss of large prey and suitable places to live, illegal hunting to sell **body parts** in the outlawed wildlife trade, and inadequate governmental support and protection.

San Diego Zoo Global helps big cats by supporting conservation efforts in the wild and helping with breeding programs in managed care. One positive story is our Sumatran tigers—one tigress has had three litters: a great success.

You can be a hero for wildlife, too. Go to [endextinction.org](http://endextinction.org) to find out how.



# SUMATRAN TIGER

*Panthera tigris sumatrae*

## Habitat

Sumatran tigers live in Indonesia, on the island of Sumatra. They roam the jungle forests, grasslands, and wetlands in secluded areas of the island. Other subspecies of tigers live in other parts of Asia.

## Behavior

A grown tiger spends most of its time alone. It keeps watch over its territory and hunts deer, pigs, and sometimes smaller prey like birds and monkeys.

Tigers do meet up to mate. A female tiger typically gives birth about every two years, usually to two to four cubs.

## Conservation

Sumatran tigers are Critically Endangered; fewer than 400 live in the wild. Another 250 live in managed care. Habitat destruction poses a major threat. Farmers clear forests to create open land for palm oil plantations and other crops. Another threat is illegal hunting. Poachers hunt tigers and illegally sell the whiskers, claws, organs, and other body parts.



# AFRICAN LION

*Panthera leo*

## Habitat

This lion lives among the grassy plains, savannas, open woodlands, and scrublands of sub-Saharan Africa. It hides behind brush and tall grass when stalking prey.

## Behavior

Unlike other cats, lions are social. They live in a family group called a pride. A pride usually has adult females (mothers, sisters, and cousins), growing cubs, and a few males. Prides can be as small as three or as large as 30 individuals. Female lions—lionesses—stay together for life.

Lions hunt together in groups. They hunt large prey; mostly antelope and other hoofed animals, but also baby elephants or rhinos. After the kill, lions in the pride share the food.

Lionesses give birth to one or two cubs. Young lion cubs sport spots on their fur coat. Experts think that the spots help camouflage the cubs in the tall grass.

## Conservation

In Africa, lion populations are declining, from an estimated 100,000 in the 1960s to about 35,000 today. They have disappeared from more than 80 percent of their former range. Hunting, loss of habitat, conflicts with humans, and small populations that become isolated play a major part in this decline.



# CHEETAH

*Acinonyx jubatus*

## Habitat

Most cheetahs live in the bush and savanna woodlands in southern and eastern Africa. They favor areas that have bushes, medium-length grasses, and trees.

## Behavior

Adult cheetahs are mostly solitary. Cubs stay with their mothers for a year or more. Male littermates may stay together after leaving their mother.

Cheetahs hunt by sight. First, they spy an old, weak, or very young animal. They creep as close as they can without being seen. Then, they sprint to make their kill. Cheetahs run as fast as 68 miles (110 kilometers) per hour, but only for short distances. Lions, hyenas, leopards, and wild dogs may chase cheetahs away from their kills or attack cheetahs directly.

## Conservation

Cheetahs live in many places in Africa, but populations are isolated from each other. The total number of cheetahs is about 10,000 individuals. Namibia has the largest population: about 2,500 individuals. About 200 cheetahs live in Iran. A small number of cheetahs have been recently observed, by using camera traps, in the Atlas Mountains of Morocco.

Cheetahs living in Iran and in northwestern Africa are critically endangered. In other areas, cheetahs are vulnerable. Hunting cheetahs and their prey for trophies, clearing land for growing crops, and killing by snare traps are the greatest threats to cheetah survival.



# SNOW LEOPARD

*Panthera uncia*

## Habitat

This large cat roams throughout the high mountains of Central Asia, including Mongolia and the Tibetan plateau. Its wide range extends across the international borders of 12 countries.

The snow leopard lives in scrubby forests and along rocky slopes, cliffs, and crevices of the mountainside.

## Behavior

Shy and secretive, the snow leopard rarely shows itself. Local people sometimes call it the “ghost cat.” It is most active at dawn and dusk when hunting blue sheep and ibex. Also on its menu are marmots, game birds, and small rodents. In winter, when very cold weather drives prey away, snow leopards may hunt local livestock in order to survive.

## Conservation

The snow leopard is endangered over much of its range due to loss of habitat and prey, poaching, and persecution. Recent population studies estimate 4,000 to 6,500 individuals. Efforts to help save the snow leopard have created more than 100 protected areas across their range.

Even though it is called a leopard, the snow leopard is more closely related to tigers than to other leopards.



# AMUR LEOPARD

*Panthera pardus orientalis*

## Habitat

The Amur leopard lives among the mountainous forests, valleys, and plains in Primorye region of southeastern Russia, in an area that's only about 965 square miles (2,500 square kilometers). Other leopard subspecies live in parts of Africa and Asia.

This cat's thick fur protects it from the region's very cold winters. Its fur is much denser than the fur of leopards living in the warmer climates of Africa and India. The Amur leopard's coat is a bit lighter in color than other leopards, too.



## Behavior

Adult Amur leopards live alone, only meeting to breed or, for mothers, to raise cubs. They hide or sleep most of the day. At night they are on the prowl, and hunt sika and roe deer, badgers, wild boars, and hares.

Amur leopards live in the same area as tigers. Sometimes tigers attack leopards.

## Conservation

The Amur leopard is considered to be the most critically endangered of all the large cats. Scientists believe less than 40 of these cats live in the wild. Much of their forest home is being burned and cleared to create areas for growing ferns, which are harvested and sold as a popular ingredient in Russian and Chinese foods.

# Serval

*Leptailurus serval*

## Habitat

The serval lives in grasslands along rivers and lakes in sub-Saharan Africa. It does not live in tropical rain forests.

## Behavior

Servals don't gather in groups; most adults live their lives alone. A male serval's home range doesn't overlap with the ranges of other males, but it may include the home ranges of several females. Females raise their cubs—one to three in a litter—for about a year.

Servals hunt mice, rats, moles, small birds, lizards, fishes, and frogs. They have excellent hearing. Servals listen carefully for these small animals' movements, then chase and pounce to trap them under their forepaws. To catch birds, servals jump as high as 9 feet (2.7 meters), grabbing them from the air. Leopards, African hunting dogs, and spotted hyenas sometimes attack servals.



## Conservation

Servals are not endangered. They range across wide, wild areas of Africa. Some servals live next to human villages. Some threats to their survival include destruction of wetlands, overgrazing of grasslands, hunting for pelts, and killing of its food (rodents poisoned as pests).

# JAGUAR

*Panthera onca*

## Habitat

The jaguar lives in rain forests, swampy areas, grasslands, woodlands, dry forests, and deserts from Mexico to Brazil, Argentina, and Paraguay. In recent years, jaguars have been seen in southern Texas and Arizona in the United States.

## Behavior

Jaguars hunt at night. They hide first, then ambush prey that comes close. They catch pigs, deer, tapirs, cattle, and capybaras. Jaguars also climb trees and swim in rivers. In the water, they catch caimans, turtles, and tortoises.

Adult jaguars live alone. Males and females meet briefly to mate, then separate. Mother jaguars raise one to four cubs. Once the cubs learn to hunt and eat meat, they are old enough to leave—usually when they are two years old.

## Conservation

Jaguars are listed as endangered by the Endangered Species Act. People hunt jaguars for their beautiful fur, despite the fact that jaguars are protected in many of the areas where they live. People also hunt jaguar prey, which means less food for jaguars. In addition, people destroy jaguar homes by cutting down forests, blocking streams, and draining wetlands.



# MOUNTAIN LION

*Puma concolor*

## Habitat

The mountain lion lives in forests, prairies, deserts, mountains, and swamps. It ranges from western Canada to southern South America. A small population lives in Florida. Depending on where this cat lives, people call it a cougar, puma, panther, el leon, or catamount.

## Behavior

Adult mountain lions are not social. They roam their home ranges, searching for prey and for intruders in their area. Males tend to have larger home ranges that overlap the smaller home ranges of females. Mountain lions hunt by sight, ambushing prey as it moves. They eat deer, pigs, raccoons, hares, and squirrels, but can also tackle moose and elk.

Mothers raise two to four cubs. Young cubs have spotted fur that helps them blend in with grass, brush, and spots of sunlight. After learning to hunt, cubs leave their mothers at about 18 months old.

## Conservation

Mountain lions are not endangered; however, a small, isolated population living in the upland forests of the Florida Everglades needs help. The number of Florida panthers has grown from about 30 in 1995 to about 100 in 2007, thanks to efforts that introduced new mountain lions from Texas. The Endangered Species Act also lists the disappearing populations in Costa Rica and the eastern United States as endangered.



# STAY ALIVE AND THRIVE

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## Learning Outcome

Students identify what cats and people need to survive. *NGSS performance expectation: K-LS1-1*

### Introduction

All living things need water, food, and space in order to live. People and cats also need these things. To thrive, animals also need to grow to adulthood, find a mate, and reproduce. People and cats get what they need in different ways. They find water and food differently, and they live in different spaces. One exception is the housecat; it lives around people, as a pet.

### Materials

- Copies of pictures of a child, male lion, drinking glass, lake or stream, house, woodland, dinner plate with pizza, and antelope (page 10). You can also find these pictures in the *Teacher Photo Resource PDF* at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).
- Whiteboard or other large writing surface
- Board markers
- Tape
- Copies of activity sheet, one for each student
- Pencils, crayons, or colored markers

### Activity

**Step 1:** Introduce the topic of survival by asking students some or all of the following questions: “What is your favorite food? What is your favorite drink? What would happen if we didn’t have anything to eat or drink? Could an animal survive without food or water to drink?”

**Step 2:** Show pictures of a child and a male lion. Place on a whiteboard or other surface. Draw a circle around each picture so that the circles overlap in the middle, creating a Venn diagram. Ask students to name each picture (a child or “me,” and a lion).

Introduce the other pictures in sets. For water, show the drinking glass and lake or stream. Tell students, “Everyone needs a drink, but who usually drinks from a glass? Who drinks from a lake or stream?” As you introduce each set and determine its place, tape the pictures next to the lion or the child.

For food, tell students everyone needs food. Ask, “Who usually eats pizza on a plate, and who catches an antelope?” For shelter, tell students everyone needs a place to live (a home), and ask “Who usually lives in a house, and who lives outside?”

**Step 3:** After placing the pictures, ask students if they can see a pattern. Tell students that all animals need food, shelter, and water, but these appear in different ways. Ask students what might go in the space where the two circles overlap. Write the words “water,” “food,” and “shelter” in the overlapping area. These words represent the pictures the class placed next to the child and the lion.

**Step 4:** Distribute the *Stay Alive and Thrive* activity sheets, and pencils or crayons. Have students trace the words “water,” “food,” and “shelter” in the center where the circles overlap. Ask students to draw their examples of food, water, and shelter for the child and the lion images.

**Step 5:** Create student pairs, and ask students to share their drawings and explain their choices with a partner. When ready, choose a few students to share their completed activity sheets with the class. As a student shares with the class, ask for those with similar items and choices to raise their hands. Ask guiding questions to lead students to correct answers.

### I WONDER...

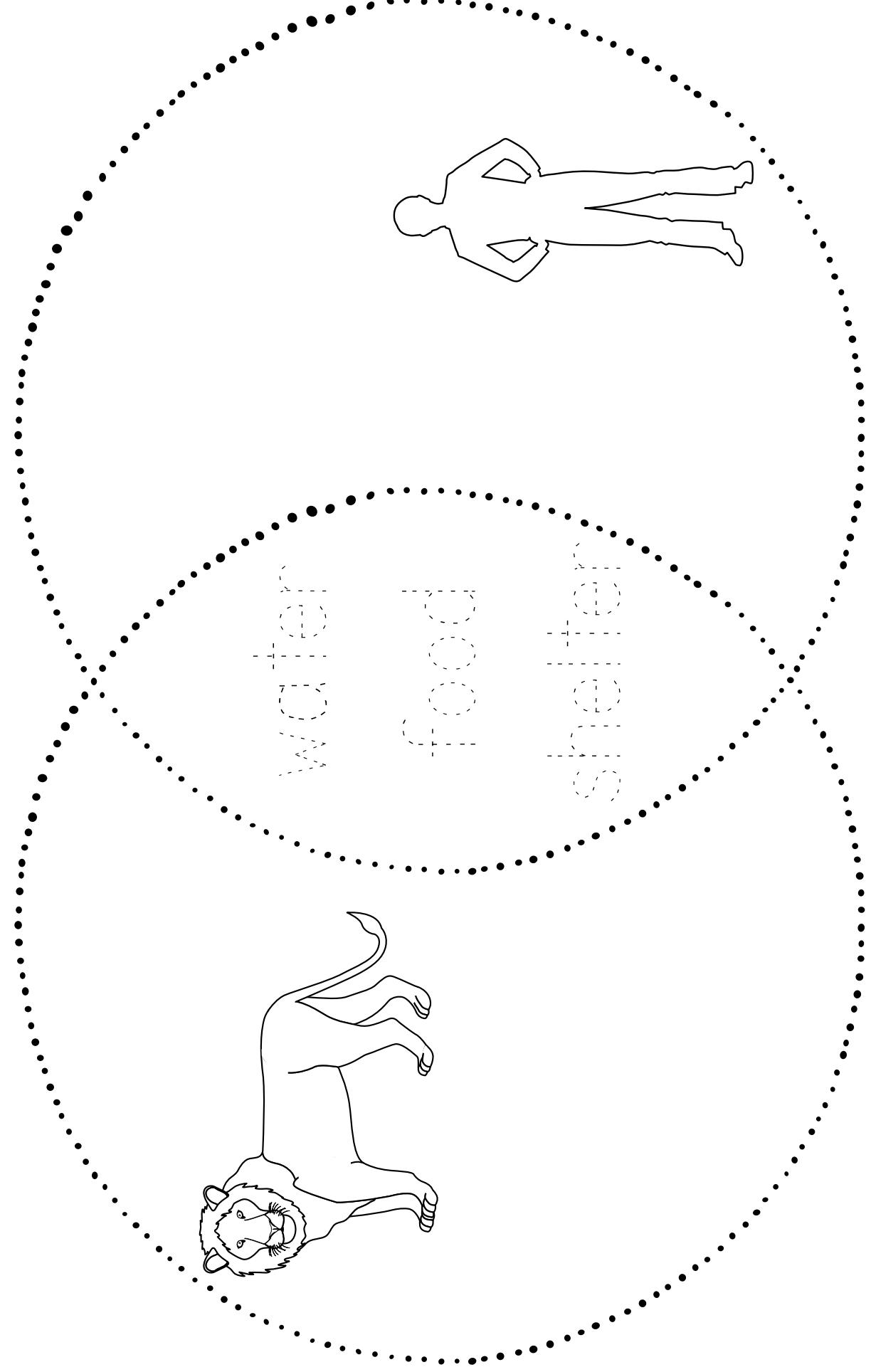
- What do other animals need?
- Ask students to choose a favorite animal other than a lion. Can they draw a new comparison sheet and describe the patterns?

### AT THE ZOO OR PARK

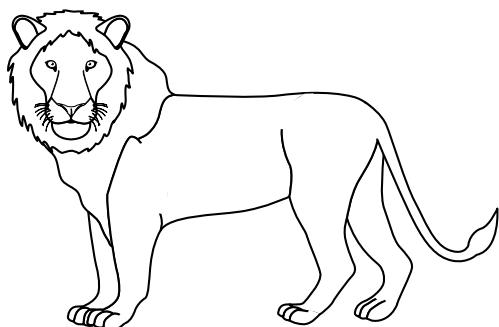
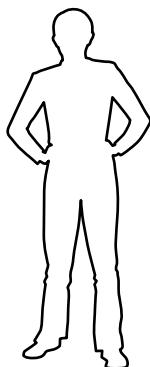
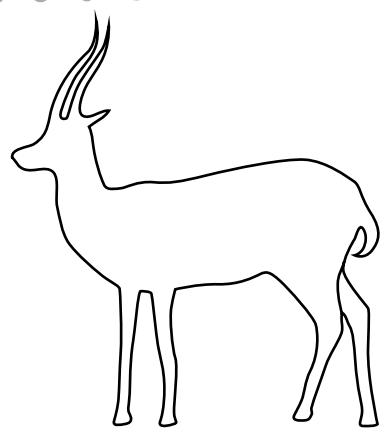
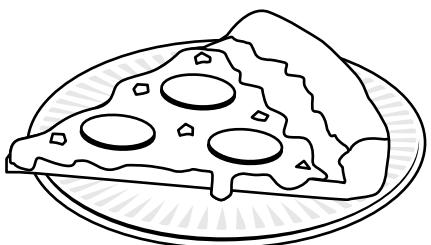
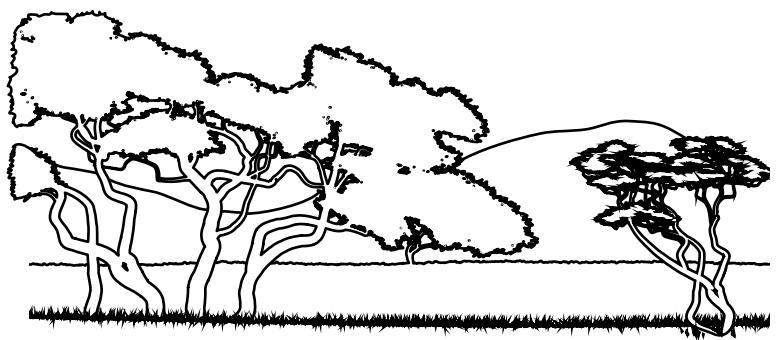
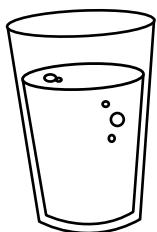
- While at the San Diego Zoo or San Diego Zoo Safari Park, look for our big cats. Can you find water, food, and shelter in the area where they live? Talk to a Park or Zoo volunteer wearing a red shirt and nametag to find out what our big cats eat.



**STAY ALIVE AND THRIVE ▶ ACTIVITY**



# STAY ALIVE AND THRIVE ➤ ACTIVITY



# SPOT ON!

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## GRADE K

### Learning Outcome

Students learn that the colors and patterns on a cat's coat are **adaptations** for **camouflage**, an important strategy when stalking prey.

#### Introduction

In the animal kingdom, **competition** for water, food, and space is fierce. Animals use many different strategies and behaviors to get what they need to survive. Big cats usually need to hide behind grass or trees to creep close enough to catch their **prey**. The color of their fur coat helps them hide.

Jaguars, tigers, leopards, and cheetahs have spots and stripes on their fur, but the patterns are different. Jaguars have separate spots in the middle of the circles (called rosettes), leopards have just circles without spots inside, tigers have stripes and no spots, and cheetahs have only spots.

#### Materials

- Pictures of a tiger in a forest, a cheetah on an African plain, a jaguar in a jungle, and a leopard in a grassland (pages 45 to 48). You can also find these pictures in the *Teacher Photo Resource PDF* at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).
- Color pictures of the coat patterns on a tiger, cheetah, jaguar, and leopard (page 12). You can also find these pictures in the *Teacher Photo Resource PDF* at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).
- Whiteboard or other large writing surface
- Yellow, brown, and black ink pads, one per student pair
- Activity sheet, one for each student
- Four blank sheets of paper
- Crayons or colored markers
- Hand wipes or moist towels

#### Activity

**Step 1:** Introduce the concept of hiding by asking the following leading questions: "Have you ever played the game Hide and Seek? How did you hide?" Then ask students, "Do any of you have a cat at home? How does it hide?"

On the board, post the pictures of the jaguar's, leopard's, cheetah's, and tiger's coat patterns. Ask students to guess what the pictures show. "Why might these cats have fur with patterns like this? What is the same? What is different?"

After students have identified the pictures as cat fur, show them how to identify each cat by its fur. Use the information under "Introduction" to point out the unique patterns for each cat.

**Step 2:** Place a blank sheet under each of the coat-pattern pictures on the board. Demonstrate how to use your fingers and the ink pad to make spots and stripes that match the pattern of each coat, as shown on page 13.

After your demonstration, divide students into groups, and distribute the activity sheets and ink pads. Ask students to choose one of the four coat patterns on the board and copy the coat pattern on their activity sheets. Distribute the hand wipes or moist towels to clean inked fingers.

**Step 3:** Show pictures of the jaguar, cheetah, leopard, and tiger in their **habitats**. After showing each picture, ask students, "Can you see the cat in this picture? Can you name it and point to it? What does its fur look like? How does its pattern help it hide? Why do you think a cat hides?" (*When hunting, a cat hides so it can sneak closer to its prey.*)

**Step 4:** Ask students to draw plants or other things around their wild cat that will help it hide.

**Step 5:** Invite students to share their artwork and describe the pattern they made, and how it will help their cat hide in the forest, jungle, plain, or grassland. If you'd like to continue, create additional copies of the activity sheet, for students to create the coat patterns of all four cats.

#### I WONDER...

- What happens to an animal when the trees and grasses that it uses to hide behind disappear? How does the animal hunt and catch prey?

#### AT THE ZOO OR PARK

- While at the San Diego Zoo or San Diego Zoo Safari Park, look for our big cats. Can you see spots, stripes, or circles on their coats? Are they hiding in their exhibit?





# SAMPLE ART PRINTS

CHEETAH



LEOPARD



TIGER



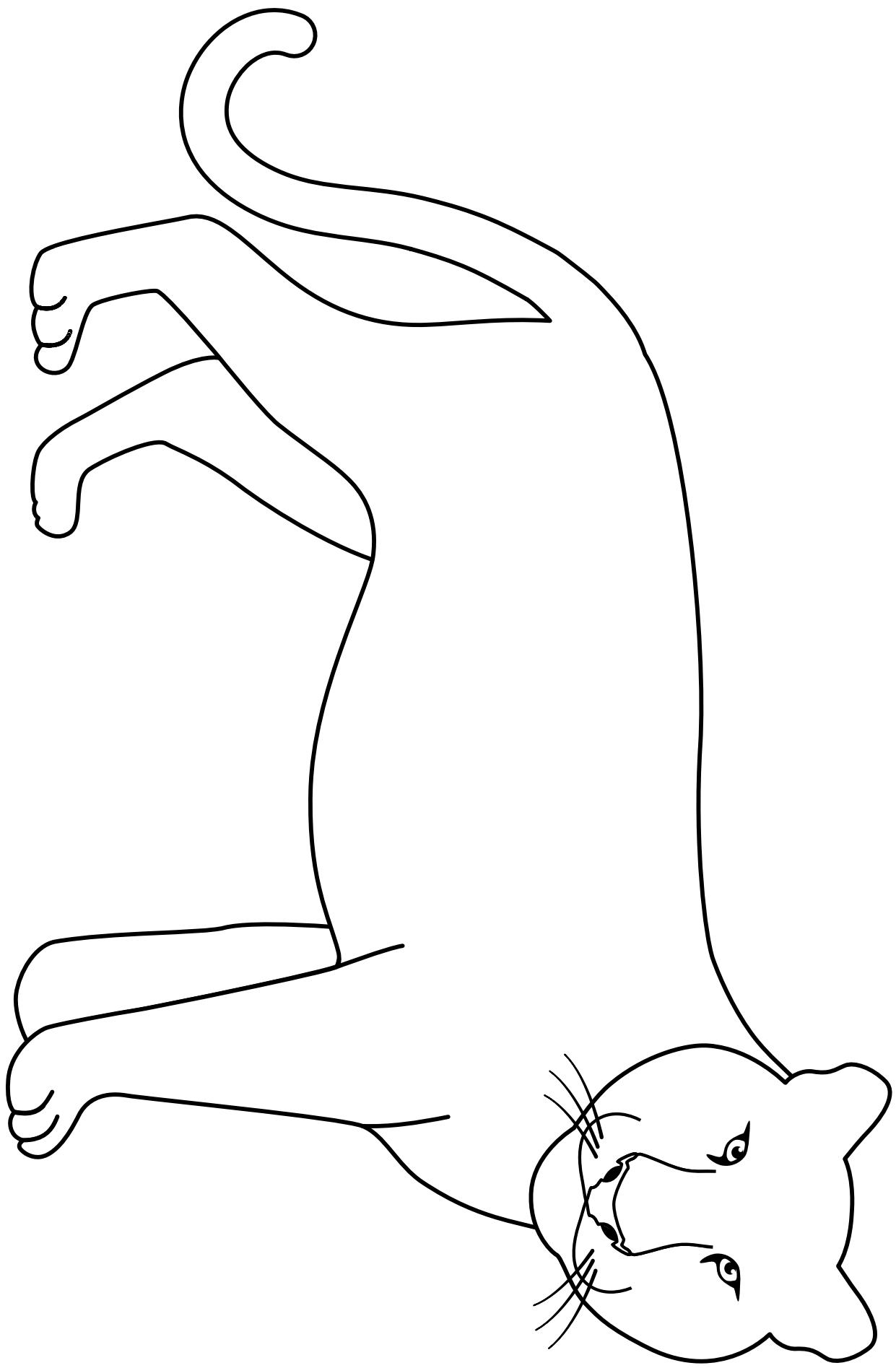
JAGUAR



# SPOT ON! ▶ ACTIVITY



Pick a wild cat, and make its spot or stripe pattern. Draw the place where it lives.



# FAMILY TIES

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

GRADE 1

## Learning Outcome

Students match different cat cubs to their cat parents by identifying similar physical traits. NGSS performance expectation: 1-LS3-1

### Introduction

Parents and offspring resemble each other in many ways, from body shape to coloration of hair or eyes. Young cats often match their parents' physical characteristics—but not always. Some differences include spots on cub coats, and darker or lighter fur colors.

### Materials

- Copies of activity sheet, one for each student
- Pencils, crayons, or colored markers
- Pictures of four domestic cats and kittens (pages 17 and 18). You can also find these pictures in the Teacher Photo Resource PDF at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

### Activity

**Step 1:** Begin this activity with a class discussion to assess prior knowledge, and to focus the topic. Show pictures of domestic cat breeds and kittens (pages 17 and 18). Ask students to look for differences and similarities between the cats. Ask students leading questions such as, “What cats and kittens belong together? What makes you think this? What traits or characteristics are you looking for?” Tell students these are domestic or pet cats. Ask students if anyone has a cat at home. Does it look like any of these cats?

Next, tell students that we will be looking at wild cats and kittens.

**Step 2:** Distribute the *Family Ties* activity sheet to each student, and create student pairs. Tell each pair to explore the characteristics of wild cats. Ask students to work with their partners to find matches. Ask students, “Now that we have compared pet cats, do you think all wild cats are the same? On the sheet, look carefully at the cubs and see if you can match each one to its parent. How are the cubs like their parents? How are they different?”

**Step 3:** When ready, review answers as a class. Invite students to explain how they made their matches. Was it the shape of the cat's face? Fur patterns? Shape of the ears?

### I WONDER...

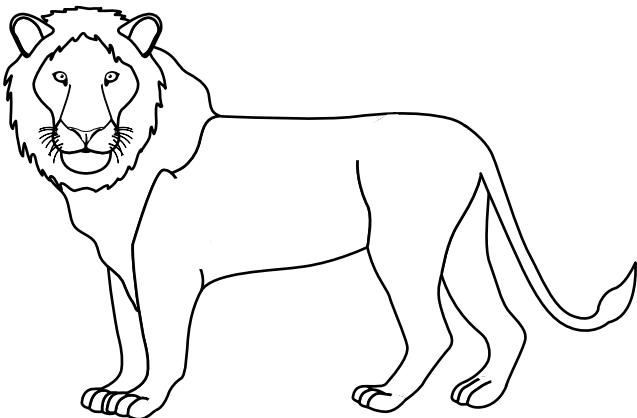
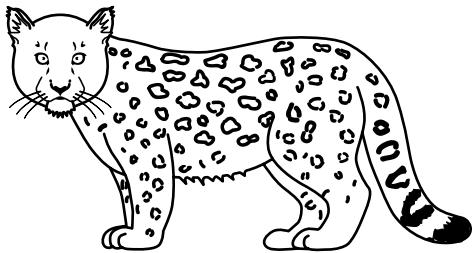
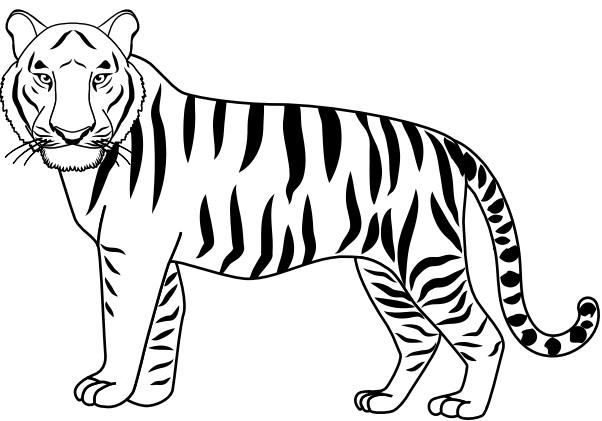
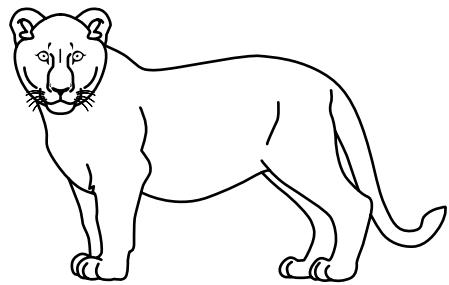
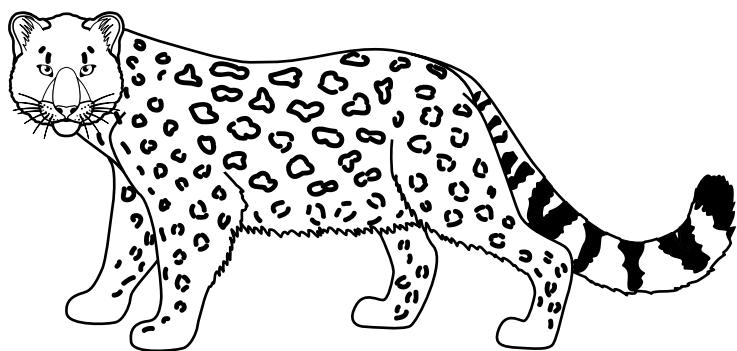
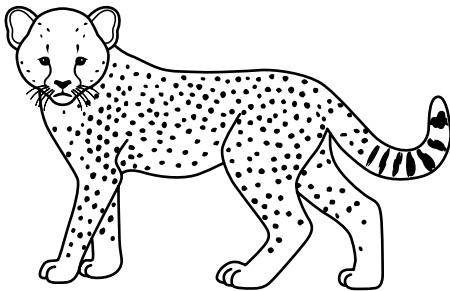
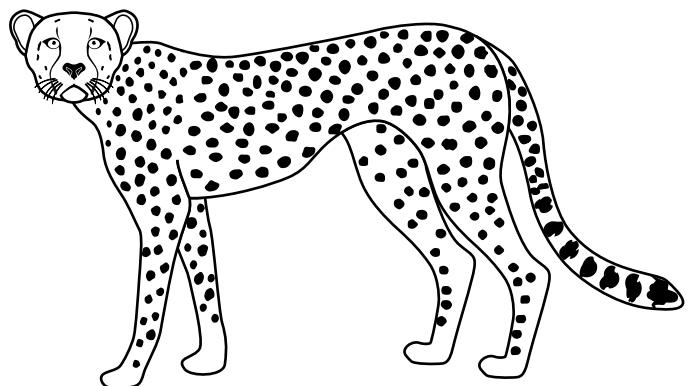
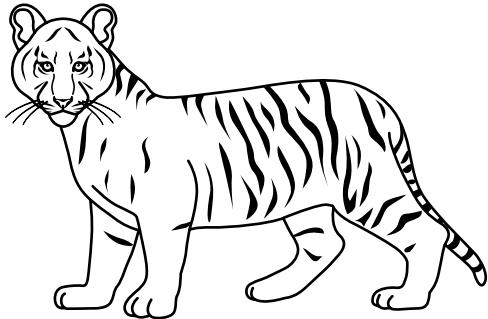
- Why do some cat cubs have spots and other cat cubs do not?

### AT THE ZOO OR PARK

- At the San Diego Zoo and Safari Park, we have been lucky to have many cats reproduce, including lions, leopards, cheetahs, and jaguars. When you visit, ask if any of our big cats have recently given birth to cubs.

# FAMILY TIES ➤ ACTIVITY

• • • • • • • • • Draw a line from each young cat on the left to its parent on the right.







# MAMMAL MEET-UP

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

GRADE 1

## Learning Outcome

Students identify five characteristics that cats share with other mammals—they breathe air, grow fur, give live birth, nurse their young, and are warm-blooded. NGSS performance expectation: 1-LS3-1

### Introduction

Scientists who study animals often look for a unique or special characteristic that sets one animal apart from another. They may sort animals with feathers, fur, or scales into different groups. They may sort animals by whether they are warm- or cold-blooded. Some animals may be sorted by the way they give birth, such as those that lay eggs and those that give birth to live young. Wild cats are mammals. Some common characteristics of mammals include the ability to grow hair (often called fur), to maintain a steady body temperature (warm blood), to give live birth, and to produce milk to nourish young.

### Materials

- Copies of activity sheet, one for each student
- Colored pencils or crayons
- Whiteboard or other large writing surface
- Board markers

### Activity

**Step 1:** Begin activity by writing the word “mammal” on the board for students to see. Ask students to identify letters and try to pronounce the word. Do they recognize it?

Lead a discussion on what this word might mean. Ask leading questions such as, “What do you think the word ‘mammal’ means? What animals do you think are mammals? Are we mammals?” Tell students that mammals can grow hair or fur, maintain a steady body temperature, give live birth, and produce milk to nourish their young.

**Step 2:** Divide students into groups and distribute the *Mammal Meet-Up* activity sheet showing a tiger, a child, a bird, a lizard, a dog, an elephant, and a fish. Ask students to talk about these animals in their groups. “Could any of them be mammals? If so, how can you tell?”

**Step 3:** After students have talked about their animals, take a class poll. For each animal, ask students to raise their hand if they think it is a mammal. Then, debate whether it is a mammal or not. What questions do students need to ask to determine if each animal is a mammal? Do they need more information, other than the picture? Can some students add additional information?

**Step 4:** Ask students to color the animals they know are mammals, and mark an “X” on the animals that are not mammals.

**Step 5:** As a final step, ask students to brainstorm a list of animals that are NOT mammals. What characteristics group fishes together? (They have scales and gills, and are cold blooded) What characteristics group birds together? (They have feathers and beaks, and they hatch from eggs.) What characteristics group lizards or reptiles together? (They have scales and lungs, and are cold-blooded.)

### I WONDER...

Can you find out which two mammals lay eggs instead of giving live birth?

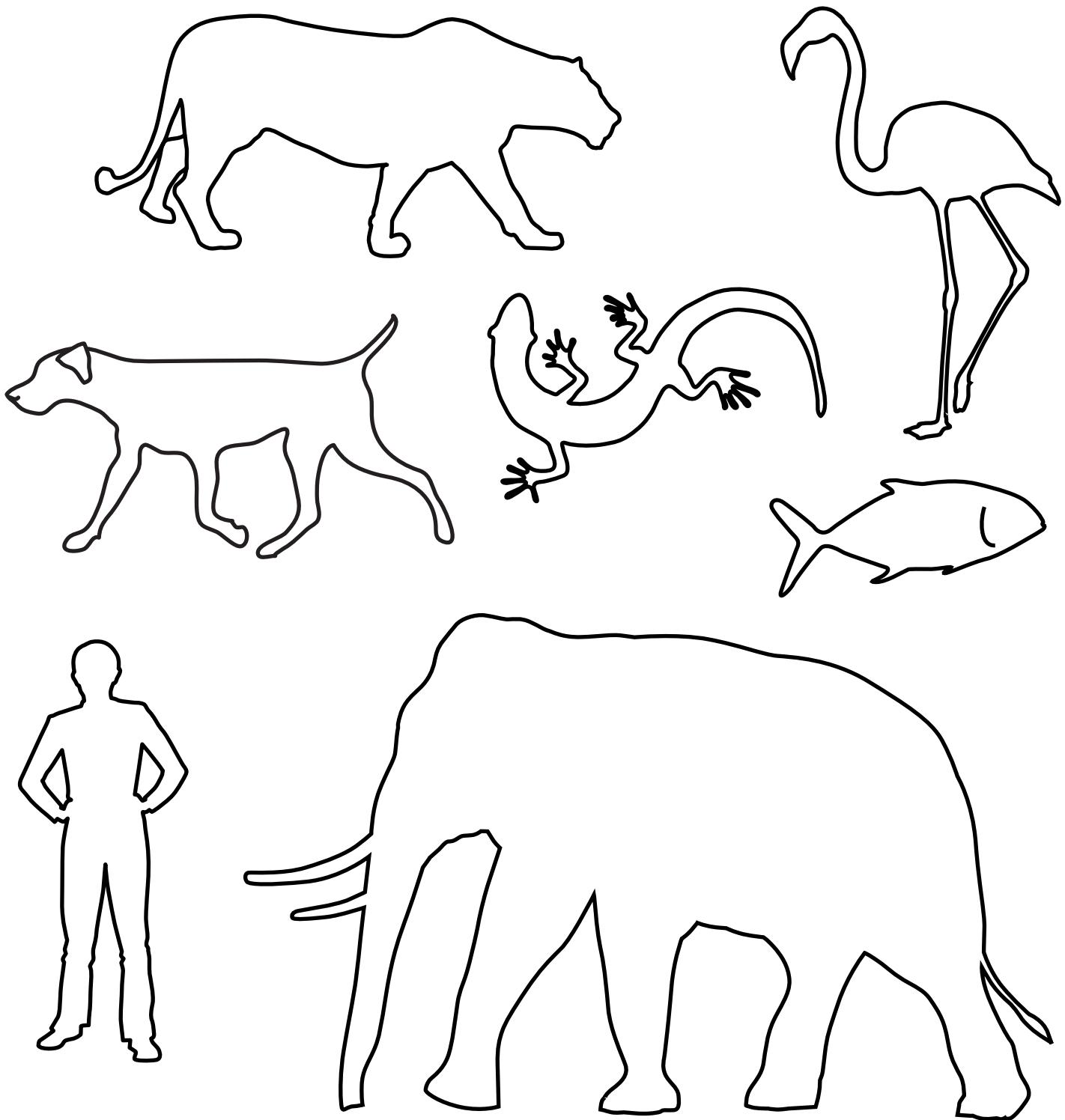
### AT THE ZOO OR PARK

While at the San Diego Zoo or Safari Park, be on the lookout for mammals. Make a list and sort them by the common traits they share.



# MAMMAL MEET-UP ➤ ACTIVITY

• • • • • • • • • • • • • • • Cats are mammals. Color the animals that are mammals, too. Put an "X" on the animals that are not mammals.



# GOING HOME

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## GRADE 2

### Learning Outcome

Students match four cat species—tiger, cheetah, jaguar, and leopard—to the habitat where they live. NGSS performance expectation: 2-LS4-1

### Introduction

Habitat is an animal's home: the area where it lives. Some animals need only a small area; for example, some tropical tree frogs live in the small pools of water collected between the leaves of a bromeliad plant. Other animals need a large area; for example, cats like jaguars, leopards, lions, and tigers roam for miles while hunting prey.

The health of a habitat is critical to the health of the animals that live in it. Habitats change when trees are cut down, soil is plowed, water is restricted, or other animals invade the area. Protecting an animal's home is the first step in species conservation.

### Materials

- Copies of four pictures: a tiger in a forest, a cheetah on an African plain, a jaguar in a jungle, and a leopard in grassland (pages 45 to 48). One four-picture set for each student group. You can also find these pictures in the *Teacher Photo Resource PDF* at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).
- Whiteboard or other large writing surface
- Board markers
- iPads or personal computers, if using digital pictures
- Copies of activity sheets, one for each student
- Scissors
- Colored pencils, markers, or crayons
- Glue sticks

### Activity

**Step 1:** Begin this activity with a class discussion to introduce the word "home." Write the word on the board. Ask students leading questions such as, "Where do we live? What is home to us?" Continue prompting with, "Do you think animals live in a home? Why or why not?"

Tell students that scientists call an animal's home its habitat. Write the following words on the board: "forest," "plain," "jungle," and "grassland." Post the corresponding cat picture under each habitat name.

**Step 2:** Divide students into pairs or small groups, and give access to the digital pictures (iPad or computer) or distribute the color prints of the four cat habitats. Ask students to find the cat in each picture and compare habitats; what is the same and what is different? Students need to remember or record their observations.

**Step 3:** Using the pictures on the board and the pictures the student groups are using, lead a class discussion about each place. What types of plants are in a forest? What types are in a jungle, a grassland, and a plain? How did the students compare them? Could they find the cat in each photo? Can they name each cat?

**Step 4:** Distribute the *Going Home* activity sheets to each student. Distribute glue, scissors, and color markers, pencils, or crayons. Ask students to cut out the cats, paste each cat into a habitat, and then color the cats to blend in with their habitats. Encourage students to share their work with their partner or in their group, explaining why they chose the specific habitat for each cat.

**Step 5:** As a class, ask student pairs or groups to present their work. As they present, discuss together the choices of habitats. Did all students make the same selection? Ask, "What is it called when an animal blends into its habitat?" (*Camouflage*.)

### I WONDER...

- Why do some habitats have few plants and animals while others have many?

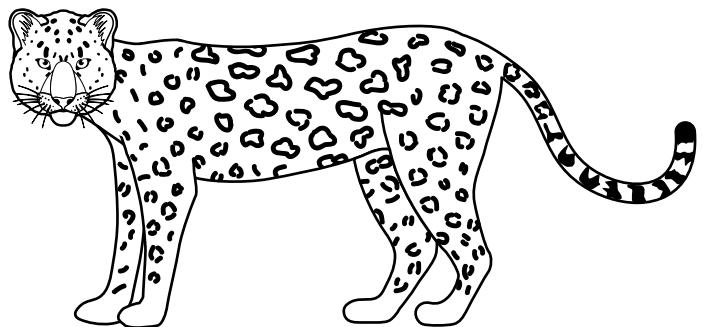
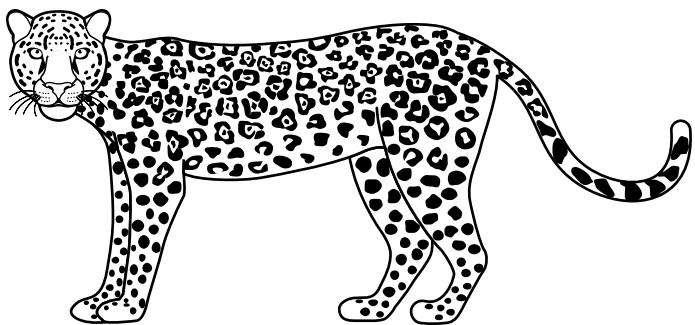
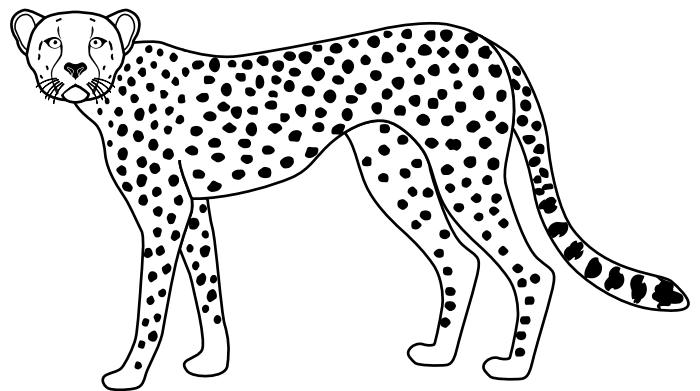
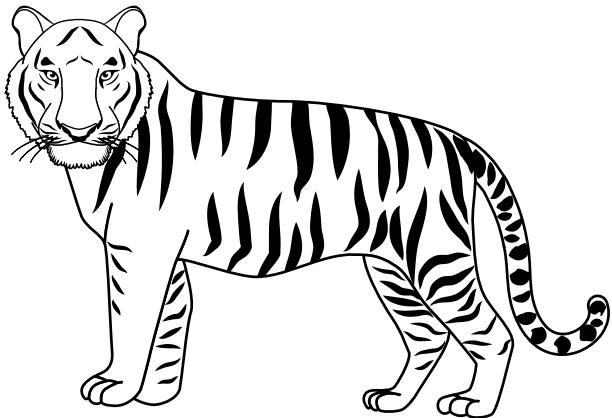
### AT THE ZOO OR PARK

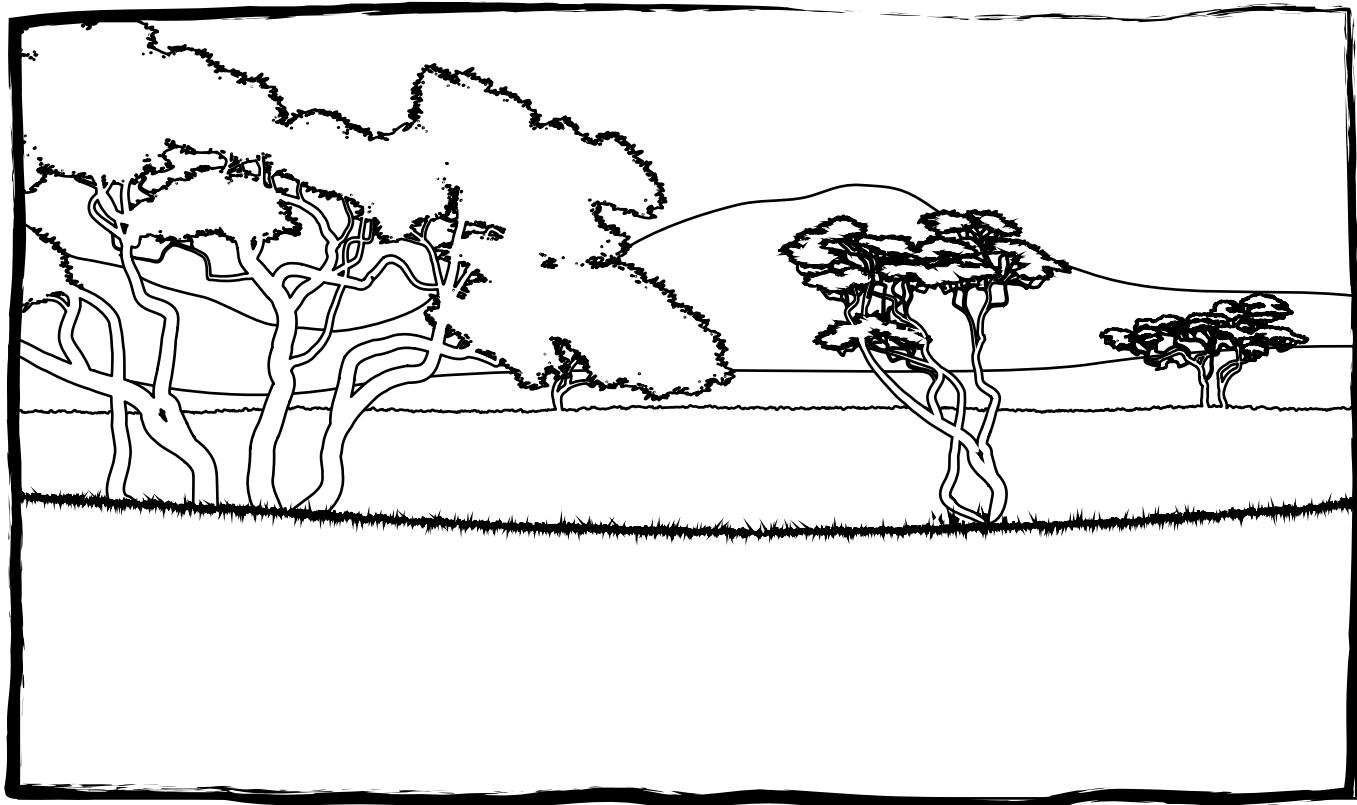
- While at the San Diego Zoo or Safari Park, visit the tiger, leopard, lion, or jaguar exhibit.
- How does the exhibit try to match where the cat lives in the wild?



# GOING HOME ➤ ACTIVITY

- • • • • Where do I live? Cut out the wild cats, and place them in their habitats. Color the cats to blend into their habitats.

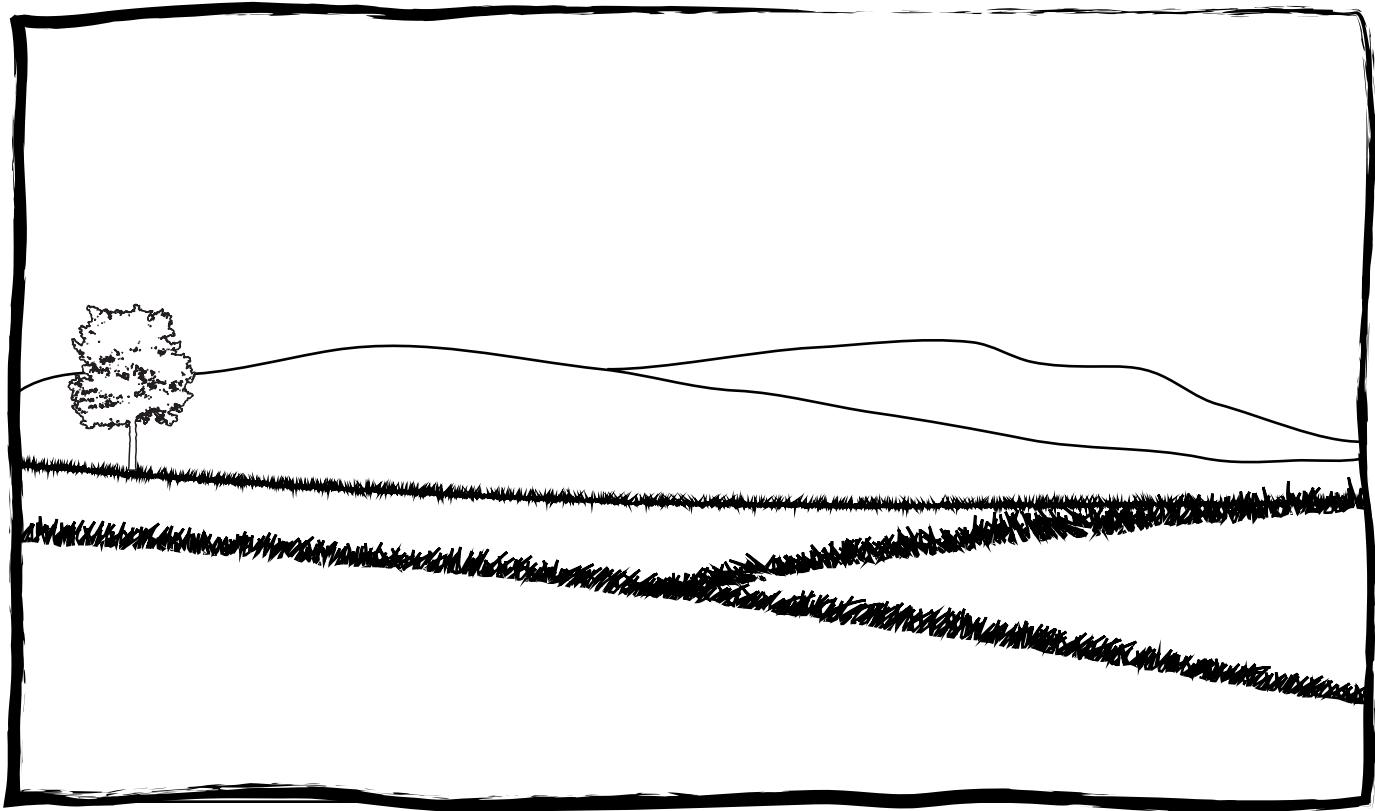




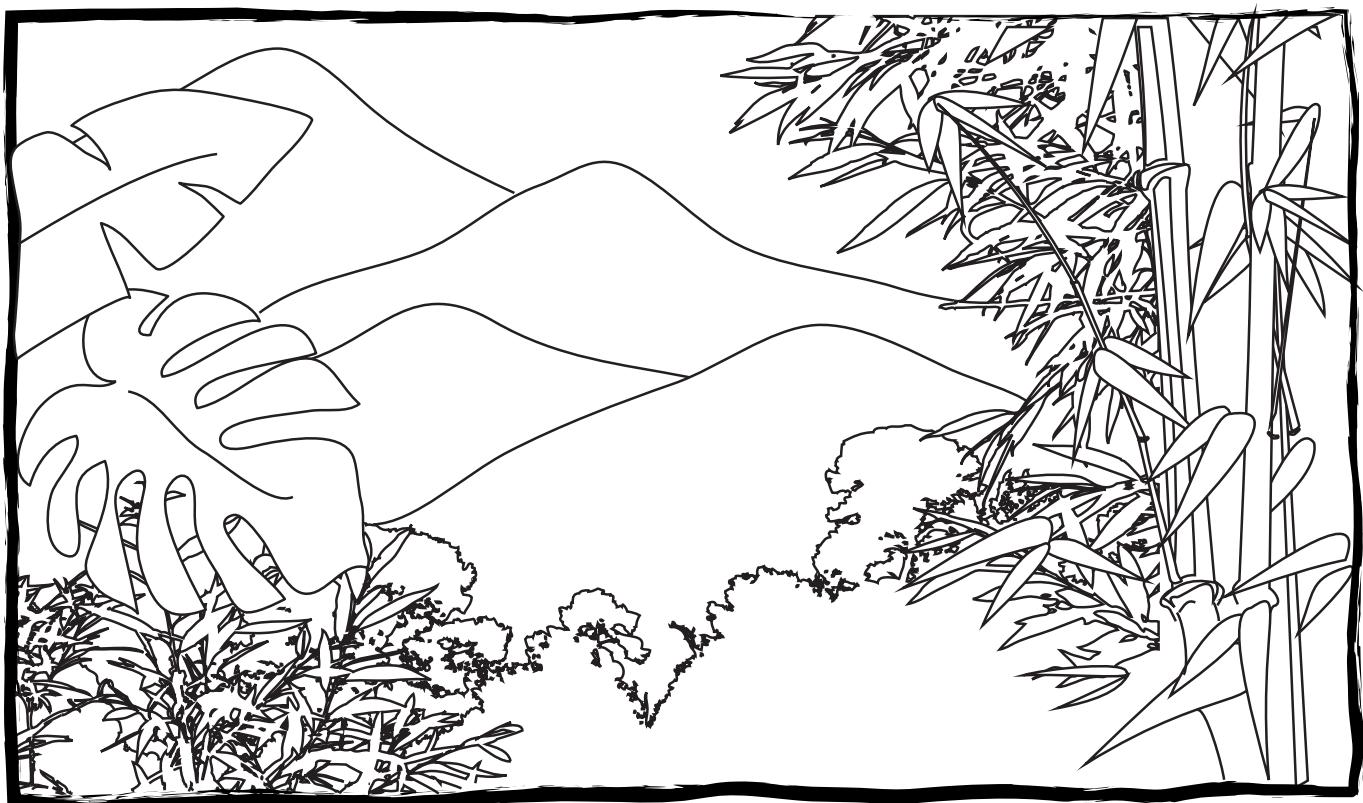
African Plain



Forest



Grassland



Jungle

# CAT-A-MANIA

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## GRADE 2

### Learning Outcome

Students know the mountain lion lives in diverse habitats including swamps, forests, deserts, and mountains. *NGSS performance expectation: 2-LS4-1*

### Introduction

Mountain lion, puma, cougar, catamount, el leon, panther...can all these names be for just one cat? Yes! Mountain lions are found from western Canada to southern South America—the largest geographic range of any land mammal in the Western Hemisphere. They live in a variety of habitats. At home in forests, mountains, deserts, and swamps, they are very adaptable cats!

Their home ranges vary in size from 30 to 125 square miles (48 to 201 kilometers). The size of the range depends on the density of the mountain lion's prey. They hunt deer, pigs, capybaras, raccoons, armadillos, hares, and squirrels. Some large cats even bring down animals as big as an elk or a moose. Mountain lions seek shelter in thick brush, rocky crevices, or caves in their home range.

### Materials

- Picture of a mountain lion. You can find this picture in the *Teacher Photo Resource* PDF at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).
- Pictures of a desert, forest, mountain, and swamp (page 27). You can find these pictures in the *Teacher Photo Resource* PDF at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).
- Copies of activity sheet, one for each student
- Colored pencils

### Activity

**Step 1:** Begin this activity by showing a picture of a mountain lion. Ask leading questions such as, "Has anyone seen this cat before? Can anyone name this cat?" Students may know many names. If so, tell them the mountain lion goes by different names (puma, cougar, catamount, el leon, and panther), depending on where it lives.

After students identify the mountain lion, ask if they know where it lives. First, show the picture of the desert. "Does the mountain lion live here?" Yes. Repeat with pictures of other habitats: mountain, forest, and swamp.

Next, show the four habitat pictures side by side for students to compare. Ask leading questions such as, "These habitats are so different. How does the mountain lion survive? What does it need to survive in each habitat?"

**Step 2:** Group students together in pairs, and distribute the *Cat-A-Mania* activity sheet, with colored pencils. Show students the four boxes on page 27, and ask them to create the habitat listed on the bottom of each box. Remind students what a mountain lion needs in order to survive.

**Step 3:** Show pictures of the habitats again, one at a time. Discuss with students the differences and challenges of living in each habitat. For example, the lack of water in a desert, the cold winters in mountains, flooded land in a swamp, and the lack of open areas in a dense forest are some of these challenges.

**Step 4:** Ask students to return to their activity sheets to add details to the habitats. Encourage discussions within their groups. Students can also use additional resources to add information.

**Step 5:** Return to a class discussion by showing the four habitat pictures alongside each other again. Ask the leading question, "Does one habitat seem to have more plants and animals than another?" Ask students to discuss and number the habitats 1 to 4 with 1 showing the most plants and animals to 4 showing the least. Humans live in these four habitats, too. Ask students to share which habitat they would want to live in, and why.

### I WONDER...

- *What happens to a habitat if a predator, like a mountain lion, disappears?*

### AT THE ZOO OR PARK

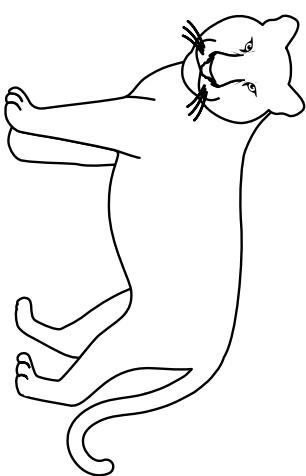
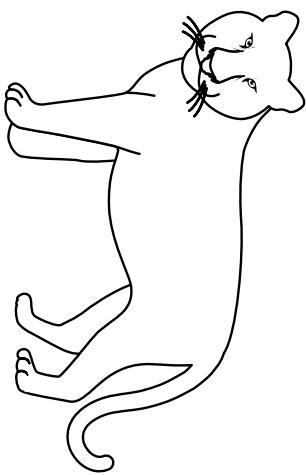
- *While at the San Diego Zoo, visit the mountain lion exhibit. Describe the kind of habitat the Zoo provides for the mountain lions. Look for the behavior and physical characteristics that make this cat a marvel at living in different habitats.*



# CAT-MANIA ▶ ACTIVITY

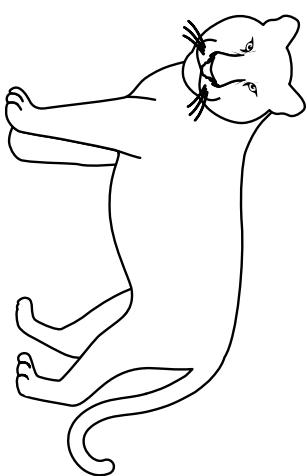
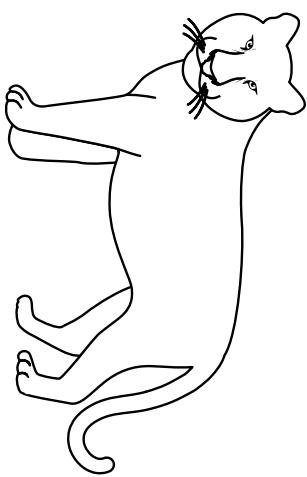


Draw the habitats for the mountain lion. Be sure to include something for your mountain lion to catch and eat, water to drink, and a place to hide.



*desert*

*mountain*



*forest*

*swamp*

**DESERT**

**MOUNTAIN**

**FOREST**

**SWAMP**

# HABITAT MATCHMAKER

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## Learning Outcome

Students create a process for selecting suitable habitats for eight cat species.  
NGSS performance expectation: 3-LS4-3

### Introduction

Planet Earth supports an almost unending array of habitats. In each particular habitat, some organisms survive well, some survive less well, and some cannot survive at all. For example, a desert tortoise survives well in the desert, but not in the ocean. On the other hand, fish can't survive in a desert habitat unless there is a water source like a spring or river. Some species, like the mountain lion, have adapted to living in a variety of habitats. In order for wild cats and their young to survive in a habitat, the cats must be able to find food, water, and shelter.

### Materials

- Whiteboard or other large writing surface
- Board markers
- Copies of the activity sheet, one per student
- Copies of Wild Cat Profile Cards (pages 4 to 7), one set per student group
- Pencils
- Digital or print pictures of the following cats: serval, Amur leopard, Sumatran tiger, African lion, jaguar, cheetah, mountain lion, and snow leopard. You can also find these pictures in the *Teacher Photo Resource PDF* at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

### Activity

**Step 1:** Animals need food, water, shelter, and ability to reproduce, in order to survive. Assess your students' prior knowledge by discussing the survival needs of animals, specifically cats. Ask leading questions such as, "What do we need in order to live? What do cats need to survive?"

Next, brainstorm a list of Earth's habitats. First, define a habitat—a place where an animal lives. Then, ask students to name habitats. Prompt responses by saying "Our planet Earth has many places for animals, from hot, humid jungles to cold, icy poles; and from high, rocky mountains to deep, ocean canyons. Who can name a habitat?" List student responses on the board. Have them guess a cat for each of the habitats.

**Step 2:** Show digital pictures or post on the board the printed pictures of seven cats (*exclude Amur leopard*), so students can see them. Tell students that this activity focuses on these cats and where they live. Divide students in pairs or small groups, and distribute the *Habitat Matchmaker* activity sheet. Tell students to read the habitat descriptions, look at the cat pictures (either digital or printed), and discuss the information with their partner or within their groups. Can they tell where each cat might live? If so, draw a line from the cat name to its habitat description.

**Step 3:** When finished with the activity sheet, have students present their reasons for matching each cat to its habitat. What did they consider? What facts or features made them select a specific habitat?

Under each cat picture posted on the board, record student responses.

If groups disagree, ask groups to explain and debate their choices. What other information would they need to determine whether their answers are correct, and what would their process be for finding that information?

**Step 4:** Distribute the *Wild Cat Profile Cards* to each student group. Have them review the descriptions to check whether their answers are correct.

**Step 5:** In conclusion, show the picture of an Amur leopard to the class. Ask students to use their previous knowledge to determine a habitat for this cat. Are there habitats where this cat is less likely to survive?

### I WONDER...

How do animals acquire survival skills for living in their habitat? Do they learn them? How?

### AT THE ZOO OR PARK

While at the San Diego Zoo or Safari Park, find a cat exhibit. By looking at the cat and its surroundings, can you determine its wild habitat? Ask the Zoo or Park volunteer wearing a red shirt or read the exhibit sign to find out where the cat lives and how it survives in its habitat.



# HABITAT MATCHMAKER ▶ ACTIVITY

• • • • • • • • • • • • • • • • Draw a line to match the wild cat to its habitat.

This small cat lives in grasslands along rivers and lakes in sub-Saharan Africa. It does not live in tropical rain forests.

These cats live in rain forests, swampy areas, grasslands, woodlands, dry forests, and deserts, from Mexico through South America.

These cats live on a small island located in Indonesia. These large cats in jungle forests, island roams the wetlands They roams, more secluded found in the island. grass in the island. areas of the island.

jaguar

Sumatran tiger

serval

These cats roam through the high mountains of Central Asia. They live in scrub forests and along rocky slopes, cliffs, and gullies of the mountainside.

snow leopard

cheetah

Groups of these cats live among the grassy plains, savannas, open woodlands, and scrublands of the grasslands, and woodlands. They hide behind brush and tall grass when stalking prey animals.

These cats live in forests, prairies, deserts, mountains, and swamps. They range from Canada to South America.

African lion

mountain lion

These cats live among the bush and savanna woodlands in southern and eastern Africa. They favor areas that have bushes, medium-length grasses, and trees.



# WANTED: WILD CAT ADAPTATIONS

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## Learning Outcome

Students explain how specific abilities or physical characteristics (adaptations) help a cat survive in its habitat.

### Introduction

Cats have adaptations that help them survive in their habitats. Physical adaptations include body features for eating, climbing, running, balancing, smelling, hearing, and camouflage. Another type of adaptation is behavioral. Examples of behavioral adaptations are the ways an animal hunts prey, shelters in caves or forest shrubs, climbs trees to rest and eat, and protects its cubs or kittens.

Highly adaptable cats live around the world. Tigers live in humid Sumatran forests and on freezing Russian plains. Lions roam hot and dry African savannas. Jaguars live in steamy South American jungles. Mountain lions have adapted to live in many habitats: forests, prairies, deserts, mountains and swamps.

### Materials

- Digital or print pictures of snow leopard, jaguar, lion, leopard, cheetah, tiger, serval, and mountain lion. You can also find these pictures in the *Teacher Photo Resource PDF* at [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).
- Whiteboard or other large writing surface
- Board markers
- Copies of activity sheet, one per student
- Copies of the Wild Cat Profile cards (pages 4 to 7), one card for each student
- Colored pencils or markers
- Access to Internet, library, or other resources for information

### I WONDER...

What physical and behavioral adaptations do prey animals have for avoiding a cat attack?

### AT THE ZOO OR PARK

While at the San Diego Zoo or Safari Park, look for big cats like tigers, lions, leopards, and jaguars. How are they alike? How are they different?

### Activity

Before beginning this activity, create a two-column table on the board. Label the columns "people" and "cats."

**Step 1:** Begin the activity with a class discussion about what adaptations people have for survival. Ask students, "What adaptations do you use to survive?" As students give answers, list them under the "people" column on the board. (*Physical adaptations might be feet for walking, hands for holding or moving objects, and eyes for seeing. Behavioral adaptations might be learning to swim, climb a tree, or drive a car.*)

Next, direct the discussion to focus on cats. Show digital or printed pictures of the snow leopard, jaguar, lion, leopard, cheetah, tiger, serval, and mountain lion. Ask students to name the body parts that help cats survive in the wild and list them on the board under the "cats" column. (*Examples might be ears, tails, feet, legs, claws, nose, eyes, mouth, and fur.*) Have students explain how the cat would use those body parts to survive. (*For example, the cat uses its ears for hearing prey, its tail for balance, and its claws for grabbing prey.*)

Compare and contrast the cat pictures by asking students, "Who has the longest tail? Can you guess why? Who has the longest legs? Who has the shortest ears? What do these physical adaptations tell you about their habitats?" (*For example, dense fur helps the snow leopard survive in the cold, snowy mountains; and long, sharp claws help jaguars climb trees in the rain forest.*)

**Step 2:** Distribute the *Wanted: Wild Cat Adaptations* activity sheet, one to each student, and have each student choose one Wild Cat Profile Card. Lead students through the questions on the sheet, and then ask each student to create a "Wanted" poster describing his or her cat's habitat, and the physical and behavioral adaptations for surviving in that habitat. Students may use other resources for information.

**Step 3:** When students finish, divide the class into groups to share their "Wanted" posters. How well does the cat fit into its habitat?

**Step 4:** Continuing the class discussion, ask students, "Can one cat survive in another cat's habitat? For example, can a snow leopard live in Africa? Why or why not? As habitats change, how do animals adapt?"



# WANTED: WILD CAT ADAPTATIONS ➤ ACTIVITY



Create a wanted poster for a wild cat whose adaptations help it survive in its habitat.

## WANTED WILD CAT ADAPTATIONS

Wanted (name of cat): \_\_\_\_\_

Country or continent: \_\_\_\_\_

Habitat description: \_\_\_\_\_

Physical adaptations for surviving in that habitat: \_\_\_\_\_

Behavioral adaptations for surviving in that habitat: \_\_\_\_\_



# MYSTERY SCENT

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## Learning Outcome

Students report and describe how scent is an important part of their lives, just as scent is important to cats. *NGSS performance expectation: 4-LS1-2*

### Introduction

Olfaction, or the **sense** of smell, is important to most animals. Scent can communicate personal information such as age, gender, or reproductive status. A cat has scent glands along its cheeks, sides of its mouths, between its toes and at the base of its tail, both on top and below. A cat rubs its scent on plants, rocks, trees, and the soil to tell other cats that it's been there. Domestic cats rub up against humans to mark their territory. Cats use their sense of smell to communicate with other cats, more than for tracking and catching prey.

At the San Diego Zoo and Safari Park, we use scent as sensory enrichment for our cats, big and small. Keepers can present the scent in many ways, such as sprinkling scent on a structure to promote scent marking, or making scent trails for cats to follow (with their noses) to find their food. Some of our cats' favorite scents include mint, lavender, perfume, okapi urine, and warthog feces.

### Materials

- Six paper bags
- Six small containers that can be sealed, such as bottles, plastic eggs, film canisters, or plastic pill containers
- Six cotton balls
- Baking extract oils, one of each: banana, peppermint, vanilla, lemon, coconut, cinnamon
- Copies of the activity sheet, one for each student
- Pencils

### Activity

Before beginning this activity, create six mystery scent stations: apply a few drops of baking extract oil to cotton balls (one extract per cotton ball), and place each cotton ball inside a sealed container. Finally, place each sealed container into a paper bag and number the paper bags 1 to 6. Arrange the stations around the classroom.

### I WONDER...

- What would it be like if you didn't have a sense of smell?
- Would you be able to survive?
- Would it be different for a wild cat? Would a wild cat be able to survive without a sense of smell? How?

### AT THE ZOO OR PARK

- While at the San Diego Zoo or Safari Park, pay attention to what you can smell. Record your experience in a journal and share with your class.

**Step 1:** Begin this activity with a class discussion about our sense of smell and the role of scent. Ask students to, "Close your eyes and concentrate on your sense of smell. What can you smell now?" Take student answers, and then ask, "What is your favorite scent? What is your least favorite scent? Why? Do certain scents bring to mind things that have happened to you in the past? How would scent help wild cats? How do cats and humans use their sense of smell in the same ways? How do they use it differently?"

**Step 2:** Introduce the six mystery scent stations. Divide students into six groups and distribute the Mystery Scent activity sheet. Students should spend about three to four minutes at each station. Tell students, "At each station, open the paper bag and take the lid off the container. Smell carefully! Then replace the lid and put the container back in the bag." After each student smells the container, they will answer the questions on their activity sheet. **Emphasize to students: DO NOT share answers at this time.**

**Step 3:** As a class, discuss student responses at each station. Could they identify each scent? Was the scent familiar or new? Did the scents remind them of another place or time? What feelings, if any, did the scent bring to mind?

**Step 4:** Reveal the identity of each scent, and distribute the charting and graphing activity sheet. Tell students to read the directions and present their responses in a graph.

**Step 5:** As a final step, consolidate data from the six groups into one graph, to represent the class. Were some scents more difficult to identify? To which scent did the students have the most common reaction?



# MYSTERY SCENT ➤ ACTIVITY

• • • • • • • • • At each station, open the paper bag and take the lid off the container. Smell carefully! Replace the lid and put the container back in the bag, then answer the questions for each scent.

## Station #1 Mystery Scent

Can you identify this scent?  
If so, what is it?

What does it remind you of?

How does it make you feel?

## Station #2 Mystery Scent

Can you identify this scent?  
If so, what is it?

What does it remind you of?

How does it make you feel?

## Station #3 Mystery Scent

Can you identify this scent?  
If so, what is it?

What does it remind you of?

How does it make you feel?

## Station #4 Mystery Scent

Can you identify this scent?  
If so, what is it?

What does it remind you of?

How does it make you feel?

## Station #5 Mystery Scent

Can you identify this scent?  
If so, what is it?

What does it remind you of?

How does it make you feel?

## Station #6 Mystery Scent

Can you identify this scent?  
If so, what is it?

What does it remind you of?

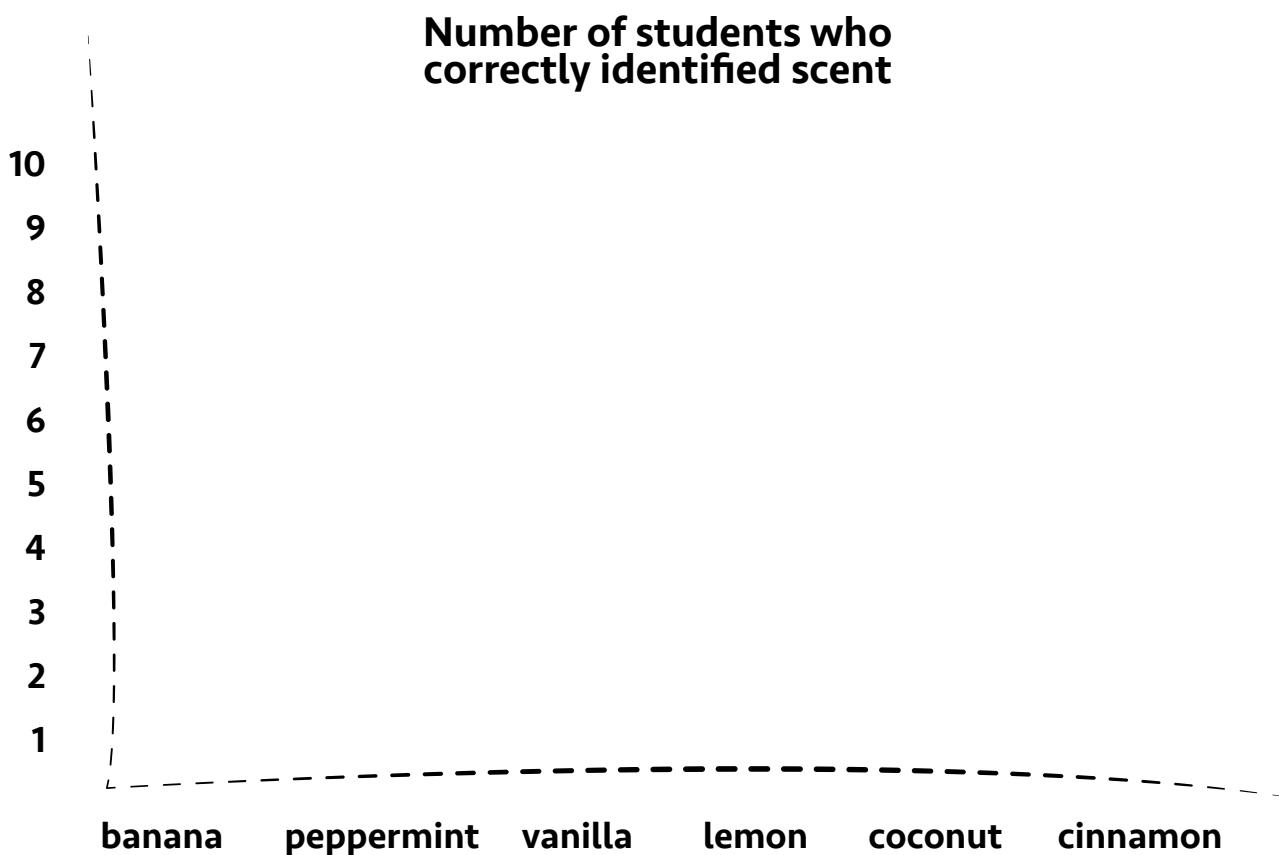
How does it make you feel?

# MYSTERY SCENT ➤ ACTIVITY



Within your group, record the number of students who correctly identified each scent.

<b>mystery scent</b>	<b>Number of students who correctly identified scent</b>
banana	_____
peppermint	_____
vanilla	_____
lemon	_____
coconut	_____
cinnamon	_____



# FIVE SENSES ROUNDUP

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

GRADE 4

## Learning Outcome

Students explain how cats receive information through their senses.

NGSS performance expectation: 4-LS1-2

### Introduction

People have five senses—vision, smell, touch, taste, and hearing—and so do other mammals, like cats. However, cat senses are adapted for their world, not ours.

- Cats can hear higher frequency sounds than people can. The hearing range of cats is from 48 Hertz (vibrations per second) up to 85,000 Hertz. This helps them find prey, like mice scurrying through grass or brush.
- Cat noses have about 200 million odor-sensitive cells; people have only 5 million odor-sensitive cells. Cats use scent to communicate with each other and to find prey.
- Cat faces have whiskers—long hairs that are very sensitive to touch. They even have whiskers on their front legs, near their feet. This extra sense of touch helps cats hunt prey at night or in dim light.
- Cats have excellent eyesight. They have wider peripheral (side-to-side) vision and can see better in dim light. A reflective layer of cells behind the retina in the cat's eye reflects light to enhance vision.
- People have about 9,000 taste buds, while cats have only about 470. Cats need taste buds to tell them if a food item is edible or not.

### Materials

- Five paper bags, each labeled with a sense
- Five plain crackers, like saltines
- Blank paper, one per group
- Five stopwatches or timers
- Copies of the activity sheet, one per student
- Pencil, one per group
- Blindfold, one per group
- Whiteboard or other large writing surface
- Board markers

### Activity

To prepare for the activity, label each paper bag with a sense (touch, taste, sight, hearing, and smell) and place one cracker inside each bag.

**Step 1:** Ask students to name their five senses. After identifying sight, taste, hearing, smell, and touch, ask students to vote on which sense they think they rely on the most. Rank the senses according to student votes.

**Step 2:** Divide students into five groups and ask each group to select a “sensor,” a data recorder, and a timer. Distribute the blank paper, stopwatch or timer, and a pencil to each group’s data recorder. Tell students that each group will receive one paper bag with a mystery object inside. Written on the paper bag will be a sense—sight, smell, taste, touch, or hearing. The “sensor” of each group can use ONLY that one sense to identify the object in the bag. Other students in the group will monitor the “sensor” to make sure that he or she doesn’t use any of the other four senses.

Ask the group to discuss this limitation and to make accommodations. For example, if the “sensor” must use only the sense of touch, he or she can’t see it, smell it, hear it, or taste it. If the “sensor” has the sense of

### I WONDER...

- How do animals and people cope when they lose one of their senses? For example, how do they cope with eye or ear injuries, or diseases that cause nerve damage and loss of the sense of touch?

### AT THE ZOO OR PARK

- While at the San Diego Zoo or Safari Park, go to an exhibit to watch a cat. How does it use its senses? Does it sniff the air or the ground? Does it see or hear you?





*continued*

taste, he or she can't see it, hear it, touch it, or smell it. The data recorder of the group writes observations and records any comments. The timer starts the stopwatch and stops it when the "sensor" whispers his or her answer to the data recorder.

When ready, ask student groups to begin. Remind the "sensor" to whisper his or her answer to the data recorder, so that others in the class don't hear it.

**Step 3:** As a class, ask each data recorder to present his or her observations, and the time it took to identify the object. Record and compare the recognition times among the groups. Which sense recognized the cracker in the least amount of time? How do the findings compare with how the class ranked the different senses in the initial discussion?

**Step 4:** Distribute the *Five Senses Roundup* activity sheet and additional pencils. Instruct students to identify the body parts that cats use to gather information through their senses. Tell students to note any parts that are different from those of humans, such as whiskers or larger ears.

**Step 5:** Conclude this activity by comparing human senses to cat senses. Create a T-chart on the board. Ask "What cat senses are more sensitive than ours?" (*Sight, hearing, touch, and smell.*) Discuss why cats might need these senses.

## SAMPLE T-CHART FOR COMPARING CAT AND HUMAN SENSES

	CAT	HUMAN
SIGHT	SEE BETTER IN LOW LIGHT	
HEARING	HIGHER FREQUENCY	
TOUCH		SENSITIVE SKIN
SMELL	200 MILLION ODOR-SENSITIVE CELLS	
TASTE		MORE TASTE BUDS ON TONGUE

# FIVE SENSES ROUNDUP ➤ ACTIVITY

• • • • • • • • • Identify and label how the tiger senses its environment.  
Write an explanation next to the body part.



# CALLING ALL CATS

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).

## Learning Outcome

Students create food pyramids with five trophic levels for cats living in Africa, Asia, and North America. *NGSS performance expectation: 5-LS2-1*

### Introduction

When scientists study a particular ecosystem, they often want to identify the interactions between plants and animals and determine the energy flow within the system. A **food pyramid**, or energy pyramid, graphically represents the feeding (trophic) levels with the plant/animal interactions.

A food pyramid typically has a wide base representing **producers**: living organisms that create their own food or energy. On land, plants fill this level. Through the process of photosynthesis, plants use the sun's energy to produce food. The next feeding level is often held by animals that eat plants: **herbivores**. Successive levels represent additional links in the food chain, such as **primary and secondary carnivores**; animals that eat other animals. At the "top" of the pyramid is a carnivore that eats other animals, but isn't prey. This animal is called an **apex predator**. In addition, **decomposers** degrade organic matter and return the nutrients to the food web, chain, or pyramid.

### Materials

- Copies of food pyramid, one for each student
- Copies of Wild Cat Profile Cards on pages 4 to 7, one card for each student (*duplicate as needed to accommodate class size*)
- Access to Internet, library, or other resources for information

### Activity

**Step 1:** Begin the lesson with a discussion about food chains, food webs, and food pyramids, to assess prior knowledge. Ask students leading questions, such as, "Can anyone tell me about food chains? Who can explain a food chain and give me an example? What are food webs? What does a food pyramid show?"

**Step 2:** Divide students into teams, and give students a cat card and a food pyramid activity sheet. Tell students to label the first level "producer" and the top level "apex predator," and to include "decomposers" as a trophic level. Allow time for students to research their cat and complete their food pyramid.

**Step 3:** Ask student teams to show their pyramids and present their findings. Ask students to explain the facts they found. Group completed food pyramids by cat species and geographic location (Africa, Asia, and North America), and, as a class, analyze them for similarities and differences.

**Step 4:** Tell students to add another apex predator: humans. Invite the students to discuss this addition among their team members. Does this change their food pyramid? If so, at what trophic level? (*Humans make an impact on all trophic levels.*)

**Step 5:** Ask student teams to create a list of plants and animals that form a food chain—either an example from their food pyramid or a new one. One by one, ask each team to write their list (not in the correct order) on the board. Students in the other teams will then compete to verbally build a food pyramid (by identifying plant, animal, and trophic level) while adding the energy source (sun for photosynthesis) and the decomposers (nutrient-recycling component). Keep score, and award the highest scoring team the honor of "apex predator."

### I WONDER...

- How can different animals fill the same trophic level in a food pyramid? Can I represent energy flow in a food web?

### AT THE ZOO OR PARK

- Look for the top cat predators, such as lions and tigers.



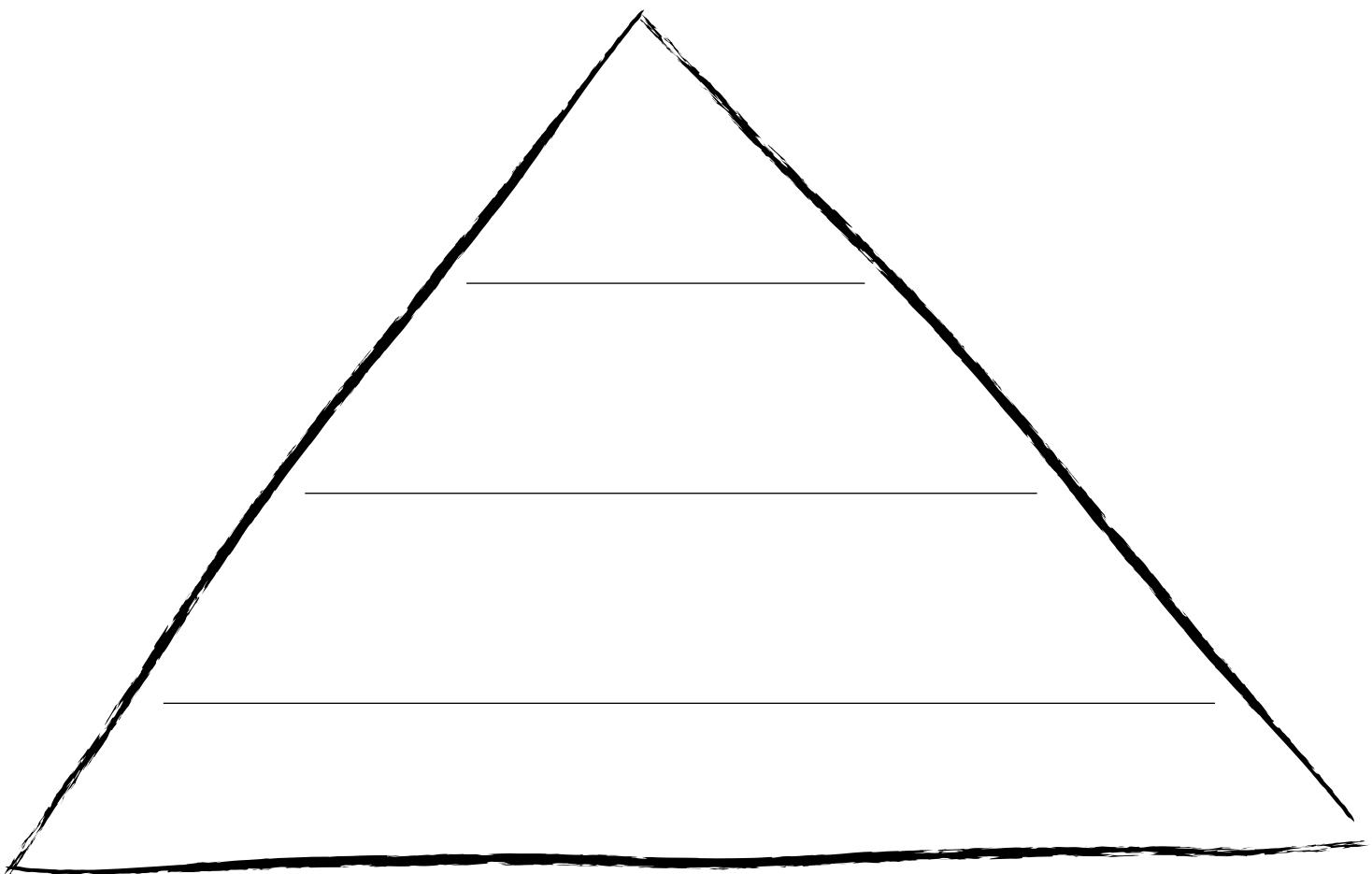
# CALLING ALL CATS ➤ ACTIVITY



Research your cat species to answer these questions:

- What does your cat eat?
- Does another animal eat your cat?

Identify your trophic levels, and then complete your food pyramid with the correct plants and animals.

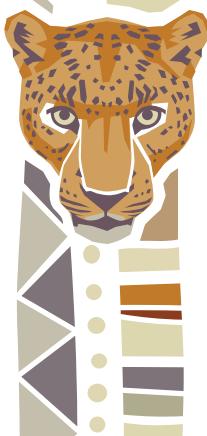


My food pyramid is \_\_\_\_\_

# TOP CAT

## TEACHER'S KEY

To download the curriculum PDF with the teacher's key and additional pictures, visit: [sandiegozoo.org/teacherresources](http://sandiegozoo.org/teacherresources).



## Learning Outcome

Students define and explain the role of apex predators. *NGSS performance expectation: 5-LS2-1*

### Introduction

An apex predator—an animal within a food chain that preys on other animals but has no predator itself—plays a vital role in the health of an ecosystem. When an apex predator disappears, its prey populations increase, overhunting or overgrazing the animals or plants they consume. This can lead to loss of diversity and even the disappearance of other plants or animals. The changes that result in food chains caused by adding or removing apex predators produces what scientists call a “trophic cascade.”

### Materials

- Example of a food pyramid
- Copies of the activity sheet, one per student
- Pencils
- Access to Internet, library, or other resources for information

### Activity

**Step 1:** Begin by building on the previous activity with student teams that have created a food chain, or start with a new example of a food pyramid. Review the terms producer, consumer, decomposer, herbivore, carnivore, and **detrivore** within the context of the sample food pyramid.

**Step 2:** Divide students into pairs or small groups, and tell students this activity focuses on the apex predator and its role in a food pyramid. Distribute the *Top Cat* activity sheet and allow time for students to research their cats.

Invite students to locate the cat's role in each ecosystem's food pyramid. Is every cat an apex predator in each food pyramid? If not, why not? Tell students to record their opinions on the activity sheet.

**Step 3:** As a class, review each team's opinion about a cat's role as apex predator. On the board, record opinions (yes/no) for each cat and select an appropriate graph format (pie, bar, or line) to represent the data. Did some cats prove more difficult to identify as apex predators?

**Step 4:** Tell students that apex predators play a critical role in the food pyramid. These predators exert a “top-down” force on the animals and plants below them. What might happen if cat populations decline or the cat disappears from an area all together? Invite students to discuss this within their group, and write opinions on the activity sheet for each cat.

Then, as a class, discuss the outcomes of the food pyramid, one cat at a time. Did all students predict the same outcome? What were the variations? Do you think that scientists are able to predict this?

**Step 5:** Write the following words on the board: Producers—grasses and flowers; Consumers (herbivores)—marmot, pika, bharal (blue sheep), sika (deer), ibex; Consumers (carnivores)—tiger, gray wolf, and dhole (wild dog). Tell students these are parts of an ecosystem for the snow leopard. Ask students to construct a food chain and a food pyramid for the snow leopard with appropriate trophic levels and labels. Review results as a class.

### I WONDER...

- Why are apex predators less likely to survive? Why do they often disappear first from a food chain?

### AT THE ZOO OR PARK

- Look for apex predators.

# TOP CAT ➤ ACTIVITY

• • • • • • • • • • Find information about each cat, and answer the questions.

- Prey: capybara, marsh deer, giant anteater, red brocket deer, turtles, fishes, birds, and alligator.

## Jaguar

- Predator: none

- Is this cat an apex predator? Circle your answer: yes/no

- What would happen if this cat disappeared? Prey numbers would increase.

• Prey: \_\_\_\_\_

Lion • Predator: \_\_\_\_\_

• Is this cat an apex predator? Circle your answer: yes/no

• What would happen if this cat disappeared? \_\_\_\_\_

• Prey: \_\_\_\_\_

## Cheetah

• Predator: \_\_\_\_\_

• Is this cat an apex predator? Circle your answer: yes/no

• What would happen if this cat disappeared? \_\_\_\_\_

• Prey: \_\_\_\_\_

Snow Leopard • Predator: \_\_\_\_\_

• Is this cat an apex predator? Circle your answer: yes/no

• What would happen if this cat disappeared? \_\_\_\_\_

• Prey: \_\_\_\_\_

Sumatran tiger • Predator: \_\_\_\_\_

• Is this cat an apex predator? Circle your answer: yes/no

• What would happen if this cat disappeared? \_\_\_\_\_

• Prey: \_\_\_\_\_

Serval • Predator: \_\_\_\_\_

• Is this cat an apex predator? Circle your answer: yes/no

• What would happen if this cat disappeared? \_\_\_\_\_



# ONLINE RESOURCES

*To learn more about cats at the San Diego Zoo*

[zoo.sandiegozoo.org/animals](http://zoo.sandiegozoo.org/animals)  
[ielc.libguides.com/sdzg/factsheets/index](http://ielc.libguides.com/sdzg/factsheets/index)

*To learn more about cats at the San Diego Zoo Safari Park*

[sdzsafaripark.org/park-animals-plants](http://sdzsafaripark.org/park-animals-plants)

*To learn more about research and conservation*

[www.endextinction.org](http://www.endextinction.org)

*To have fun exploring the San Diego Zoo Global Kids' website*

[kids.sandiegozoo.org](http://kids.sandiegozoo.org)



## ZOONOOZ on iPad

Get the latest news on all our animals here. Go to [sandiegozoo.org/zoonooz](http://sandiegozoo.org/zoonooz) to download the app for iPad.

## Connection to the Next Generation Science Standards

The materials and activities presented in this guide are just one step toward reaching the standards and performance expectations listed below.

### Standards

- LS1: From Molecules to Organisms: Structures and Processes
- LS2: Ecosystems: Interactions, Energy, and Dynamics
- LS3: Heredity: Inheritance and Variation of Traits
- LS4: Biological Evolution: Unity and Diversity

### Performance Expectations

**Kindergarten:** K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

Dimension	Name or NGSS citation	Student tasks in activity
Science and engineering practices	Analyzing and interpreting data	Students identify and match survival items (food, water, shelter) to humans and animals.
Disciplinary Core Ideas	LS1.C Organization for matter and energy flow in organisms	Students draw what animals need to survive.
Cross-cutting Concepts	Patterns	Students notice similar needs (food, water, shelter) in different forms.

**Grade 1:** 1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are alike, but not exactly like, their parents.

Dimension	Name or NGSS citation	Student tasks in activity
Science and Engineering Practices	Constructing explanations and designing solutions	Students review photos to explain and match different breeds of young and parent pet cats.
Disciplinary Core Ideas	LS3.A Inheritance of traits	Students identify and match wild young cats to parents.
Cross-cutting Concepts	Patterns	Students identify similarities and differences in cat appearances.

**Grade 2:** 2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.

Dimension	Name or NGSS citation	Student tasks in activity
Science and Engineering Practices	Planning and carrying	Students explore different places (habitats) where cats out investigations live, then create criteria to place cats in their correct home.
Disciplinary Core Ideas	LS4.D Biodiversity and humans	Students create different places (habitats) for different cats.
Cross-cutting Concepts	None	None

**Grade 3:** 3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Dimension	Name or NGSS citation	Student tasks in activity
Science and Engineering Practices	Analyzing and interpreting data	Students examine a variety of habitats to analyze resources available for survival.
Disciplinary Core Ideas	None	None
Cross-cutting Concepts	Cause and effect	Students compare survival needs and strategies for different cats in different habitats.

**Grade 4:** 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

Dimension	Name or NGSS citation	Student tasks in activity
Science and Engineering Practices	Engaging in argument from evidence	Students gather data and argue identity of mystery scents.
Disciplinary Core Ideas	LS1.D Information processing	Students experience identifying different scents.
Cross-cutting Concepts	Systems and system models	Students explore how cats use their senses to explore their environment.

**Grade 5:** 5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Dimension	Name or NGSS citation	Student tasks in activity
Science and Engineering Practices	Developing and using models	Students explore food webs and pyramid, and then build their own.
Disciplinary Core Ideas	LS2.A Interdependent relationships	Students identify the role wild cats have within an ecosystem's food web, and how, when a cat disappears, the ecosystem relationships change.
Cross-cutting Concepts	Systems and system models	Students learn trophic levels within food pyramids.

# GLOSSARY

**adaptation.** A physical characteristic or behavior that helps a plant or animal survive in its habitat.

**apex predator.** An adult animal that consumes other animals (prey), but is not preyed upon.

**body part.** Any part or piece of an organism such as a limb, a tail, feathers, horns, or fur.

**camouflage.** Protective coloring that animals use to blend into their environment in order to avoid being seen by predators or prey.

**carnivore.** An animal or plant that eats other animals.

**competition.** The process of trying to get resources before others do.

**consumer.** A living organism that must eat in order to survive. Some consumers eat plant matter (herbivores), some eat other animals (carnivores), and others eat a variety of foods (omnivores).

**decomposer.** An organism that recycles dead organic matter into useful nutrients within a food pyramid. Bacteria and fungi are decomposers.

**detrivore.** An animal that eats animal waste or decaying plants and animals.

**endangered.** Populations so low that they are moving toward becoming extinct.

**extinct.** A species of animal or plant that once lived.

**felidae.** In scientific classification, the family of cats, or felids.

**food.** Nutrients necessary for energy and health.

**food pyramid.** A graphic representation that illustrates the reduction of energy between the trophic levels of a specific ecosystem. This model is also called a trophic pyramid or an energy pyramid.

**habitat.** The place where an animal lives.

**herbivore.** An animal that eats plants.

**predator.** An animal that hunts and eats other animals.

**prey.** An animal that is killed and eaten by another animal (predator) for food.

**olfaction.** The sense of smell.

**omnivore.** An animal that eats both plants and other animals.

**photosynthesis.** A process by which green plants and other organisms turn carbon dioxide and water into carbohydrates and oxygen.

**plant.** Organism that makes its own food by photosynthesis.

**producer.** Organism that makes its own food. Plants and some bacteria are capable of self-nourishment.

**scavenger.** An animal that eats dead plants or animals.

**senses.** Ways we receive information: sight, hearing, smell, taste, and touch.

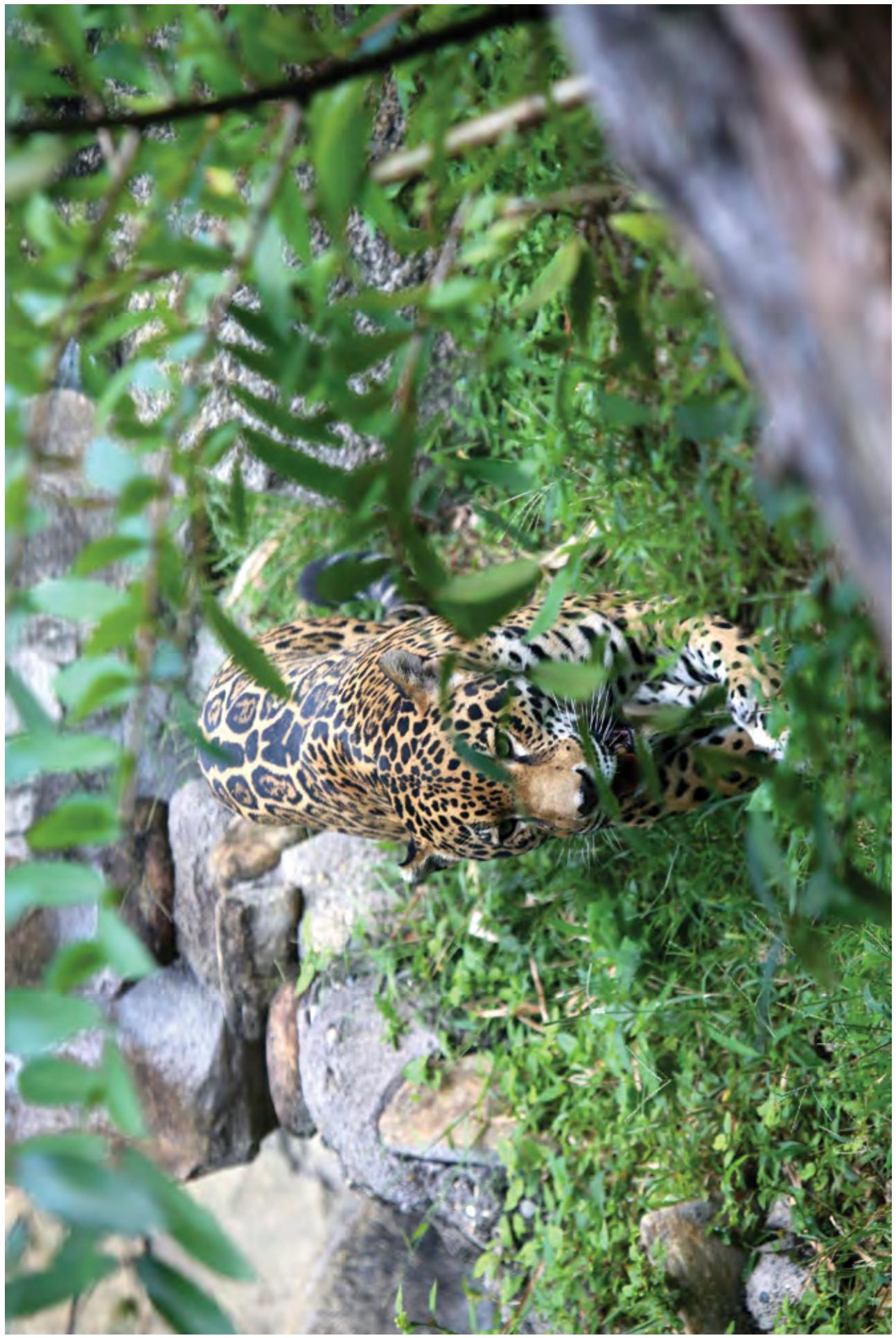
**shelter.** A place to sleep, rest, or live that provides protection from predators and weather.

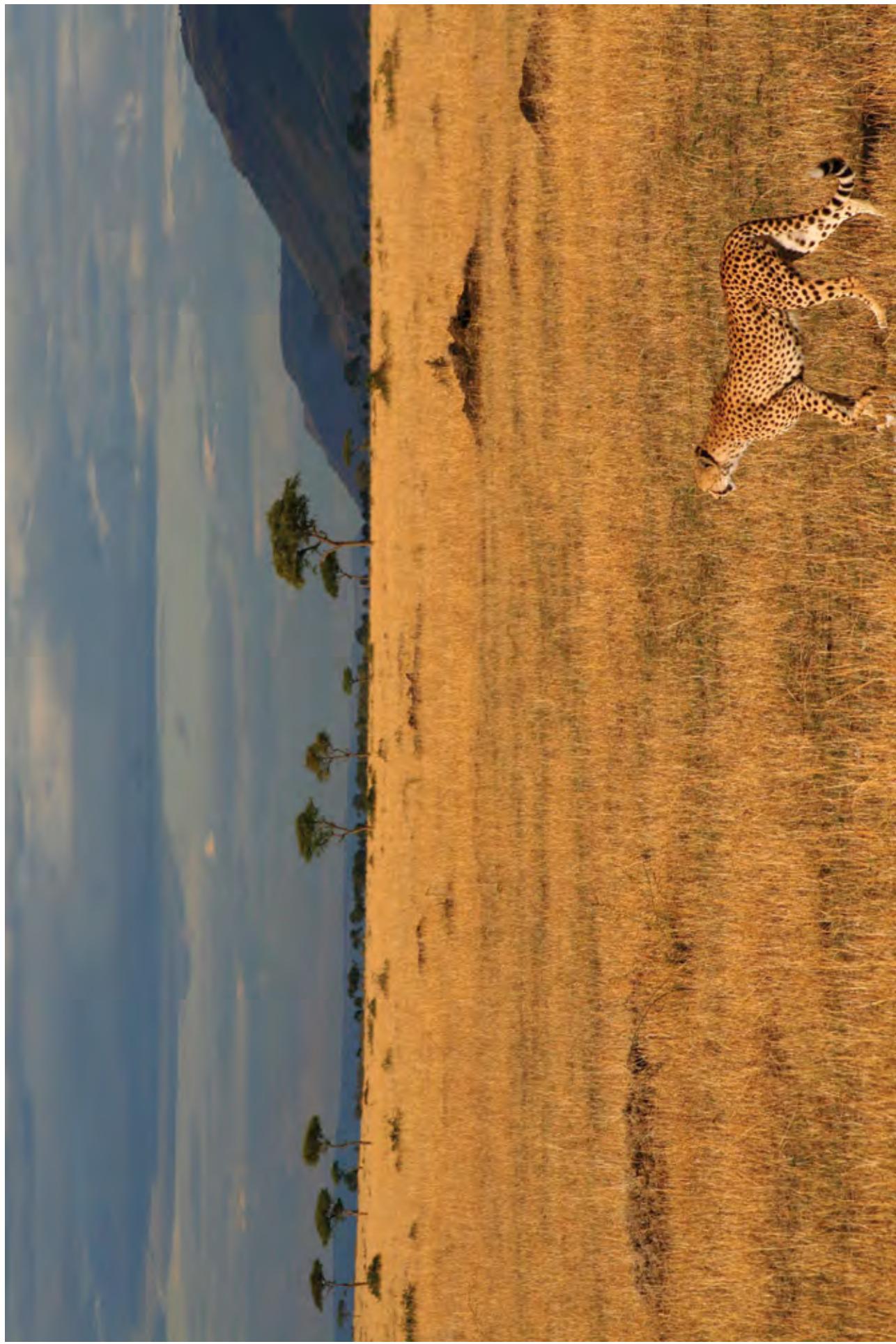
**space.** An area encompassing land that allows for life activities like eating, sleeping, food gathering, and finding a mate (may be a few feet or many square miles, depending on the species).

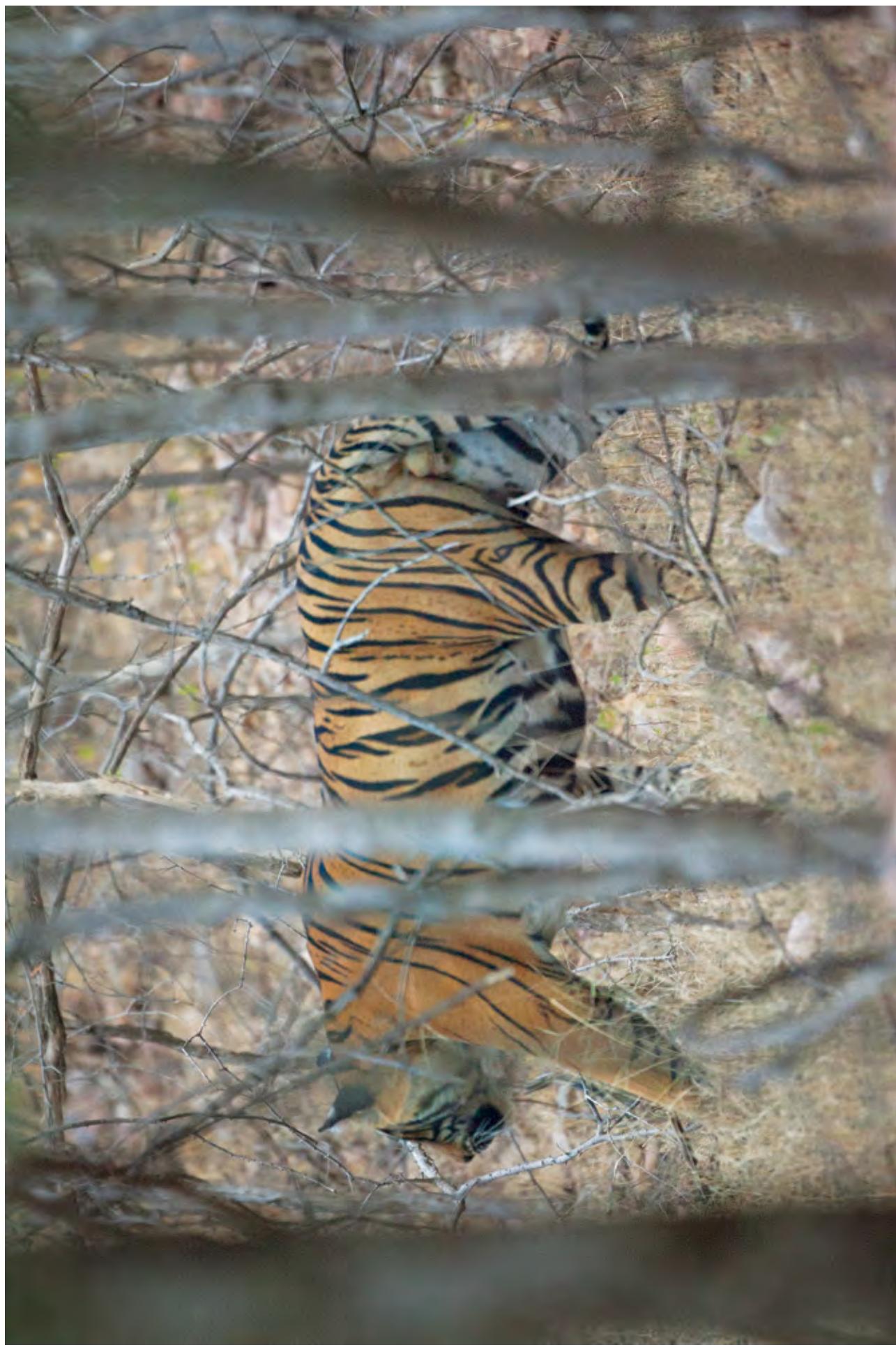
**species.** A group of animals that share common characteristics and mate to produce fertile young.

**survival.** Using adaptations to continue to live.

**trophic level.** Within the context of a food pyramid, the graphic representation of the role each plant or animal plays within a food chain. Trophic levels include producers, consumers, and decomposers.











**AFRICAN LION**

A close-up photograph of a zebra's head and upper body. The zebra has dark brown stripes on a light tan background. Its large, dark eyes with white pupils are looking directly at the camera. The ears are black with white tufts of hair at the tips.

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