

CHAPTER

2

Vocabulary Preview

inherit
trait
mammal
bird
amphibian
gills
fish
scale
reptile
instinct
hibernate
migrate
camouflage
mimicry
extinct
species
endangered
threatened
fossil

Types of Animals

How many different kinds of animals can you name? You probably listed animals such as cats, dogs, cows, and fish. But there are many more. Even though there are many kinds of animals, they all need the same types of things to live and grow.

Fast Fact

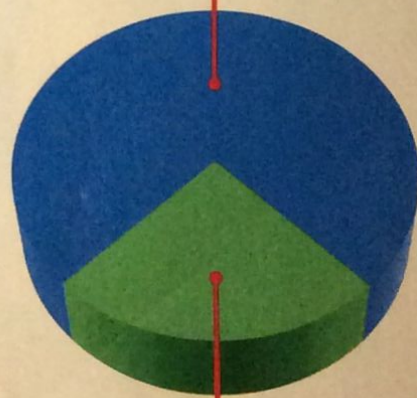
It's a trick! These butterfly fish have spots on their tails that look like eyes. The "eyes" scare away larger fish that might eat them.

Fast Fact



Types of Animals on Earth

75% insects



25% all other animals

Swat! Slap! Mosquitoes bite.
Bees sting. Of every 100
types of animals in the world,
75 are insects.

LESSON

1

What Is an Animal?

In this lesson, you can . . .



INVESTIGATE
animal homes.



LEARN ABOUT
how animals meet
their needs.



LINK to math,
writing, literature,
and technology.



INVESTIGATE

Animal Homes

Activity Purpose Everyone needs a place to live—including animals. Animals live in many kinds of places that give them the things they need. In this investigation you will **observe** animal homes and use the homes to **classify** the animals.

Materials

- Animal Picture Cards



◀ Ladybugs eat other insects on this bluebonnet.

Activity Procedure

- 1 Select six Animal Picture Cards or use the pictures on page A40. As you **observe** the cards, pay close attention to the types of homes the animals live in. (Picture A)
- 2 Describe each animal home you **observe**. **Record** your descriptions.
- 3 With a partner, discuss the different types of animal homes shown. Talk about the ways the animal homes are alike and the ways they are different. Then **classify** the animals by the types of homes they live in.



Picture A

Draw Conclusions

1. **Compare** two of the animal homes you observed. Tell how each home helps protect the animal that lives there.
2. What did you **observe** about the home of a Canada goose and the home of an albatross?
3. **Scientists at Work** Scientists **classify** animals into groups based on what the animals have in common. How many groups did you classify the animals into? What were the groups?

Investigate Further Study the Animal Picture Cards again. This time, look at the body covering of each animal. Describe each covering. How can you use body coverings to **classify** the animals?

Process Skill Tip

When you **classify** things, you put them into groups. You put things into a group because they have something in common. For example, you could put into one group the animals that build nests.



LEARN ABOUT

Animals and Their Needs

FIND OUT

- what animals need so they can live
- how animals' bodies help them meet their needs
- how animals get their traits

VOCABULARY

inherit
trait

What Animals Need

Have you ever cared for a pet? If so, you know that a pet needs food and water. A pet also needs shelter, or a place to live. Wild animals have the same needs as pets. The difference is that wild animals must meet their needs on their own.

As you learned in the investigation, different animals make their homes in different surroundings. From their surroundings, they get all the things they need. This is something all animals have in common.

✓ **Name three things animals need.**

This reef is made up of tiny living animals called corals. Other animals, such as the dolphin shown here, look for food in the reef and use the reef for shelter. ▼

Animals Need Air

Have you ever thought about the air around you? Air contains a gas called oxygen. Animals need oxygen to live.

Animals that live on land, such as giraffes, have lungs that get oxygen from the air. Insects get oxygen from the air through tiny holes in their bodies. Many water animals, such as fish, get their oxygen from water. Other water animals, such as whales, must come to the surface and breathe air to get oxygen.

✓ **Name two ways animals get oxygen.**



▲ **An alligator comes to the water's surface to breathe the air it needs.**

Animals Need Water

The bodies of all animals contain water. Every day some of this water leaves the animals' bodies. For example, when an animal pants or sweats, it loses some water from its body. The animal must replace this water to stay alive.

Most animals get the water they need by drinking. The water they drink may come from puddles, streams, rivers, ponds, or lakes. Other animals get most of their water in the foods they eat.

✓ **How do animals get the water they need?**

At this water hole on the African plains, animals drink the water they need. ▼



Animals Need Food

All animals need food. Food gives animals the materials they need so they can grow and stay healthy. Animals also get energy from food.

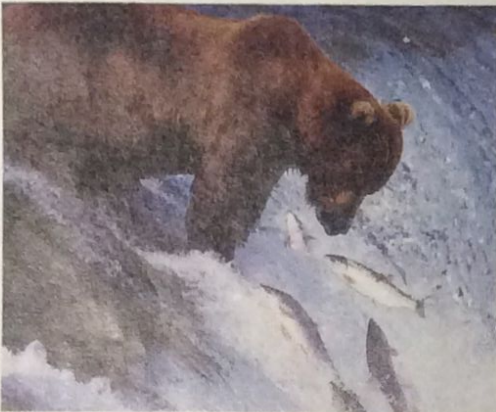
Unlike plants, animals cannot make their own food. Instead, they get their food by eating plants or other animals. Some animals eat only plants. Some eat only animals. Some eat both.

How do animals get the food they need? Many of them have body parts that help them get their food. For example, an elephant uses its trunk to grab leaves from trees. A hawk can use its sharp claws to catch a mouse.



▲ This chameleon uses its tongue to catch insects.

✓ What do animals eat?



Brown bears live in forests, where they eat many kinds of plants and animals. They often eat fish they catch in streams. They also eat grass and other plants.



A panda eats only bamboo plants. ▼



Beavers Build Shelters



1 Beavers cut down trees to build a dam in a stream.

2 The dam makes a pond. In the pond, the beavers build their home, called a lodge.

3 To build their lodges, beavers use trees they have cut down and rocks that they cover with mud.

4 Young beavers, called kits, stay warm and dry inside the lodge.

Animals Need Shelter

Most animals need shelter, or a place to live. Shelters protect animals from other animals and from the weather. Some birds build shelters called nests high in tree branches. They build their nests out of twigs, grass, and mud. Other animals, such as deer mice, build their homes in hollow logs or in spaces under rocks. Turtles use their own hard shells as their homes. Many other animals dig tunnels and make their homes in the ground.

✓ **Why do animals need shelter?**

Animal Cells

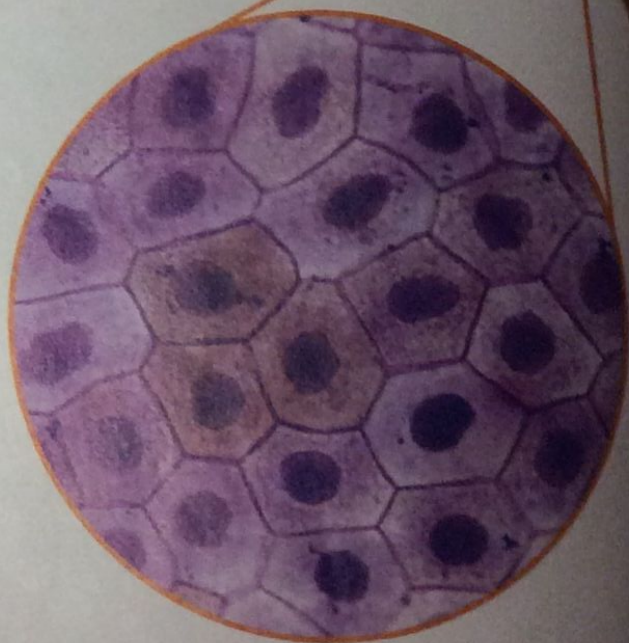
You may remember that all living things are made of small units called cells. Every kind of cell has a special function. A skin cell protects the animal from its environment. A muscle cell helps an animal move. All the cells in a living thing work together to keep the organism healthy.

Most cells cannot be seen without a microscope. However, there is one animal cell that you can see easily—an egg. The egg of any animal is a single cell. In a chicken egg, the white of the egg is food for the cell. The yellow part of the egg, or the yolk, is the cell. The largest single cell in the world is an ostrich egg.

Look at the diagram on A47 to learn more about the parts inside animal cells. Notice that animal cells do not have cell walls or chloroplasts. These are just two of the ways that animal cells and plant cells are different.

✓ **How are plant cells and animal cells different?**

All animals are made of cells. This snake has skin cells that are similar to your own. (purple) ▼

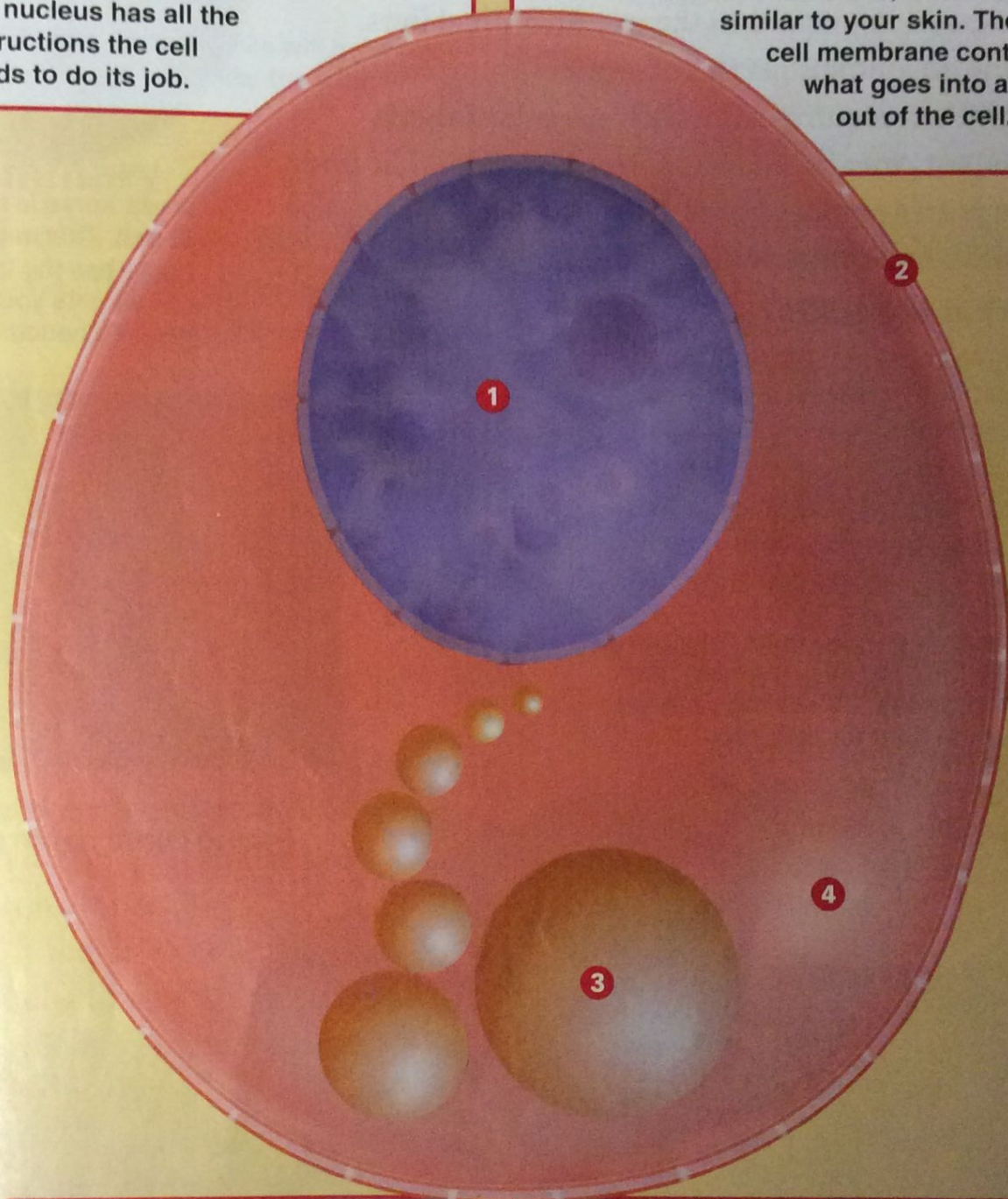


An Animal Cell

Animal cells have different shapes and sizes, but they have the same parts inside. This diagram shows you what an animal cell could look like.

1 NUCLEUS The nucleus of a cell can be compared to your brain. The nucleus has all the instructions the cell needs to do its job.

2 CELL MEMBRANE Around the cell is the cell membrane, which is similar to your skin. The cell membrane controls what goes into and out of the cell.



3 VACUOLES The vacuoles store the water that the cell needs to stay healthy, as well as waste products.

4 CYTOPLASM The inside of the cell is filled with cytoplasm. This substance is liquidlike and helps hold the other parts of the cell in place.

Animal Traits

Jellyfish, polar bears, and snakes don't look much alike, but they are all animals. Different animals have many different shapes and sizes. They also have many different body parts. For example, a bird has wings and feathers. A lion has paws and fur. All these features are important to the way an animal lives.

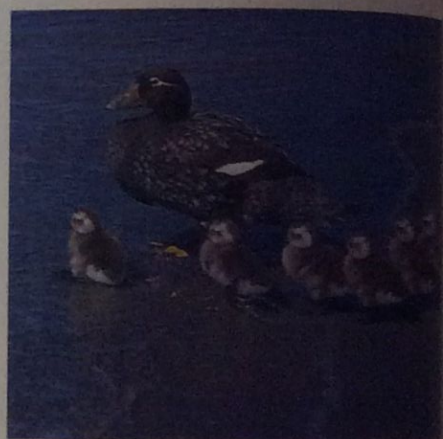
How do animals get their features? Young animals inherit their features from their parents. **Inherit** (in•HAIR•it) means "to receive from parents." The body features an animal inherits are called **traits**. Traits also include some things that animals do.

✓ What are traits?

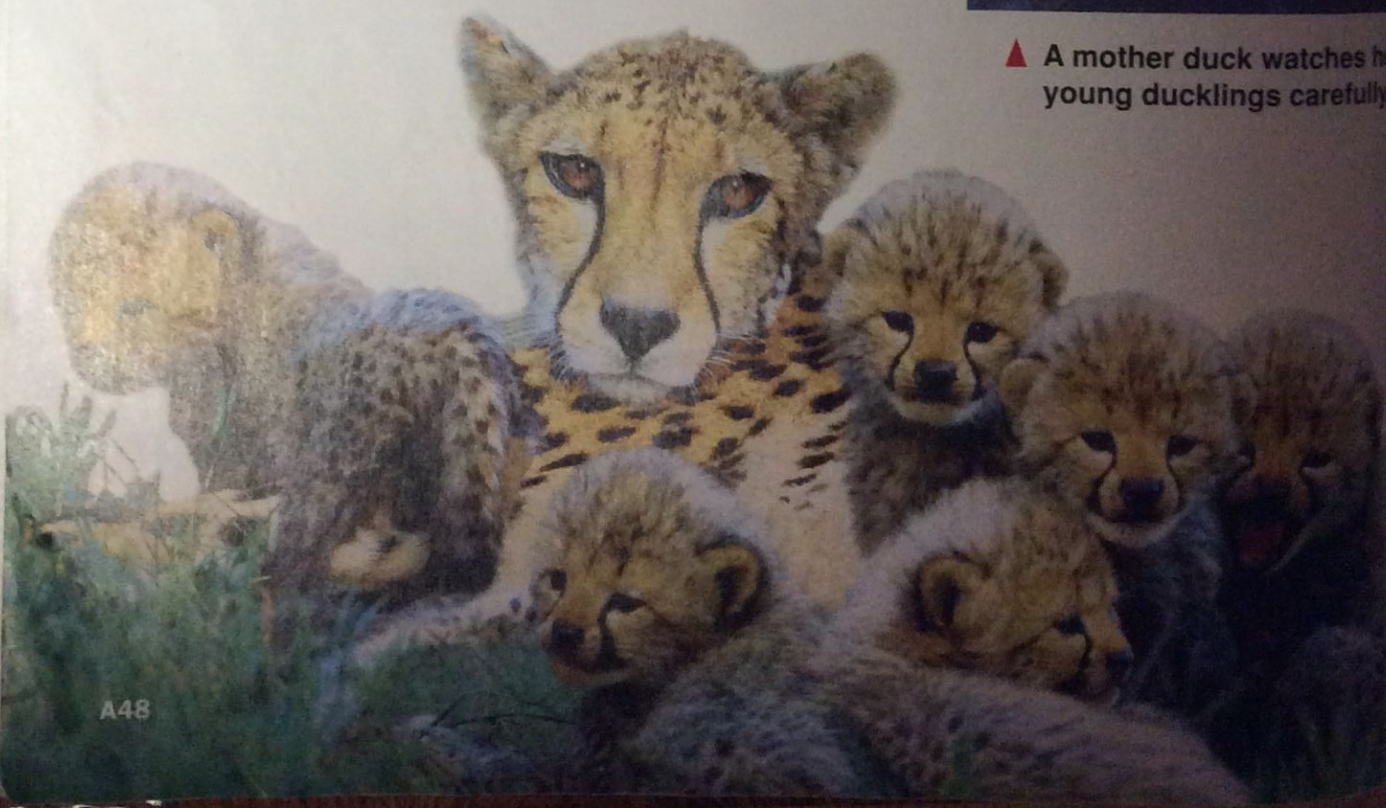
These young cheetah cubs will grow to look like their parents. They will stay with their mother for several years and will learn to hunt for their food. ▼



▲ A sea horse is a type of fish. This male sea horse has the trait of carrying its young inside a pouch.



▲ A mother duck watches her young ducklings carefully.





▲ These young snakes will grow to look very much like the adult snake.

Summary

Animals need air, water, food, and shelter. Different animals have many different shapes and sizes and many different body parts. These traits help the animals get the things they need. All animals inherit their traits from their parents.

Review

1. How do animals that live in water get air?
2. Describe how beavers change their surroundings to meet their needs.
3. What are four things that animals need?
4. **Critical Thinking** Why will a young lion cub grow to look like an adult lion and not like a sea horse?
5. **Test Prep** Which of the following is **NOT** a need of all animals?
A food C air
B water D soil

LINKS



MATH LINK

Multiply Whole Numbers

Suppose that there are 15 duck families that live at a pond. If each of the families has 8 ducklings, how many ducks would live at the pond?



WRITING LINK

Informative Writing— Compare and Contrast

Birds make many sounds. Listen to birds that live in your area. If possible, record their sounds with a sound recorder. Write a paragraph for your teacher that compares and contrasts the bird songs.



LITERATURE LINK

A Wolf Pup Diary You can learn about the life of a young wolf by reading *Look to the North: A Wolf Pup Diary* by Jean Craighead George.



TECHNOLOGY LINK

Learn more about animals by visiting the Smithsonian Internet Site.

www.si.edu/harcourt/science



Smithsonian Institution®

What Are Mammals and Birds?

In this lesson, you can . . .



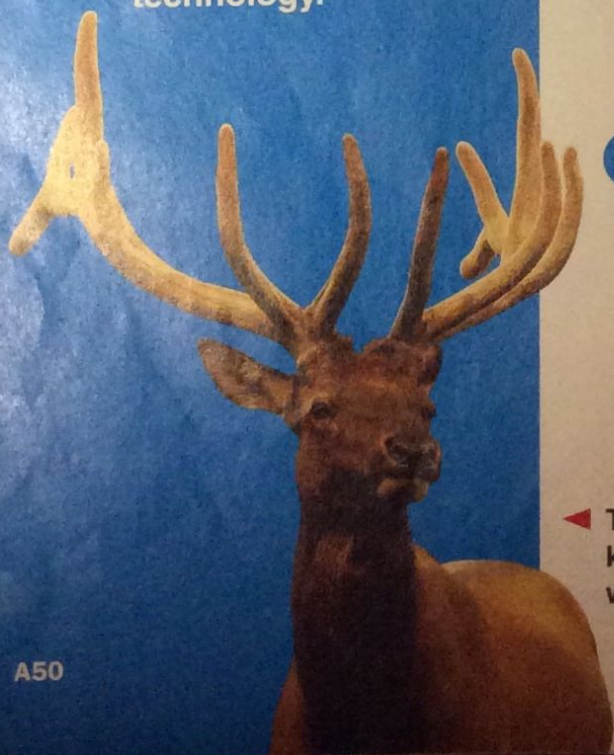
INVESTIGATE
how fur helps animals.



LEARN ABOUT
the traits of mammals
and birds.



LINK to math,
writing, art, and
technology.



INVESTIGATE

Fur Helps Animals

Activity Purpose When it's cold outside, you might put on a jacket or a sweater to keep warm. Animals can't do that. In this investigation you will **use a model** to find out how fur helps keep animals warm.

Materials

- glue
- 2 metal cans
- cotton batting
- hot water
- 2 thermometers
- classroom clock

CAUTION



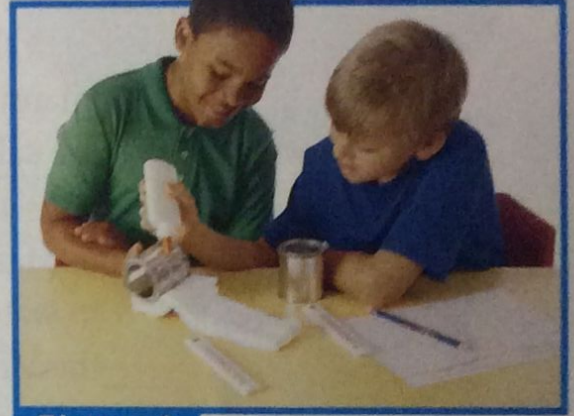
Activity Procedure

- 1 Make a chart like the one shown.
- 2 Spread glue around the outside of one can. Then put a thick layer of cotton around the can. Wait for the glue to dry. Then use your fingers to fluff the cotton. (Picture A)
- 3 **CAUTION** Be careful with the hot water. It can burn you. Your teacher will fill both cans with hot water.

◀ The fur on this deer keeps him warm all winter long.

Time	Water Temperature in Can with Cotton	Water Temperature in Can Without Cotton
Start		
10 min		
20 min		
30 min		

- 4 Place a thermometer in each can, and **record** the temperature of the water. (Picture B)
- 5 Check the temperature of the water in each can every 10 minutes for a period of 30 minutes. **Record** the temperatures on the chart.



Picture A

Draw Conclusions

1. In which can did the water stay hot longer? Why?
2. How is having fur like wearing a jacket?
3. **Scientists at Work** Scientists often **use a model** to study things they can't observe easily. In this investigation, you made a model of an animal with fur. Why was using a model easier than observing an animal?

Investigate Further How do you think your results would be different if you used ice-cold water instead of hot water? Write a **hypothesis** and **conduct an experiment** to find out.



Picture B

Process Skill Tip

It would be hard to measure the temperature of a real animal to find out how fur helps it stay warm. **Using a model** helps you learn about animal fur.



LEARN ABOUT

Mammals and Birds

FIND OUT

- four traits of mammals
- five traits of birds

VOCABULARY

mammal
bird

Mammals

In the investigation you learned that fur can help an animal stay warm. Animals that have fur or hair are called **mammals** (MAM•uhlz). Horses, cows, and dogs are all mammals.

Mammals use lungs to breathe. Mammals that live in water, such as whales, also breathe with lungs. But these mammals must come to the surface of the water to breathe the air they need.

Most mammals give birth to live young. A cat gives birth to many kittens at one time. Before the kittens

THE INSIDE STORY

Keeping Warm

A polar bear's fur looks white, but it is really clear. The fur looks white because it reflects sunlight.



The skin of a polar bear is black. The black skin takes in the heat from the sun. Polar bears have a thick layer of fat under their skin. This fat helps keep a polar bear warm.

are born, the mother cat carries them inside her. After the kittens are born, they feed on milk made by their mother's body. Feeding their young with milk from the mother's body is another trait of all mammals.

When a mammal is born, it cannot care for itself. It must be sheltered and fed by its mother. The milk gives it what it needs to grow and stay healthy.

Most mammals learn from their parents how to care for themselves. The parents often teach their young how to find food. In time a young mammal learns what it needs to know to live on its own.

✓ **What are four traits mammals inherit from their parents?**



▲ These puppies drink milk from their mother to get the food they need.



◀ Gorillas often live in large families. All the adults help care for the young.

Types of Mammals

There are many types of mammals. Most of them have the four traits you read about. Some also have other traits, such as trunks, pouches, or wings. Mammals are often placed into groups based on traits they share. Some of these groups and their traits are shown on this page.

✓ **Name three traits used to place mammals in groups.**

A koala is one of a few mammals that carry their young in a pouch. ▼



▲ This spiny echidna (ee•KID•nuh), an anteater, has fur and lungs. It is a mammal, but it does not give birth to live young. It lays eggs.



▲ Bats are the only mammals that fly.

This orangutan (oh•RANG•oo•tan) is a primate. Primates are mammals that can use their hands to grasp objects. ▼



Whales are mammals that live in water. They have very little hair. This helps them glide easily through the water. ▶

Birds

Birds are animals that have feathers, two legs, and wings. Most birds use their wings for flying. Some birds, such as penguins, cannot fly. But like other birds, they still have feathers and wings.

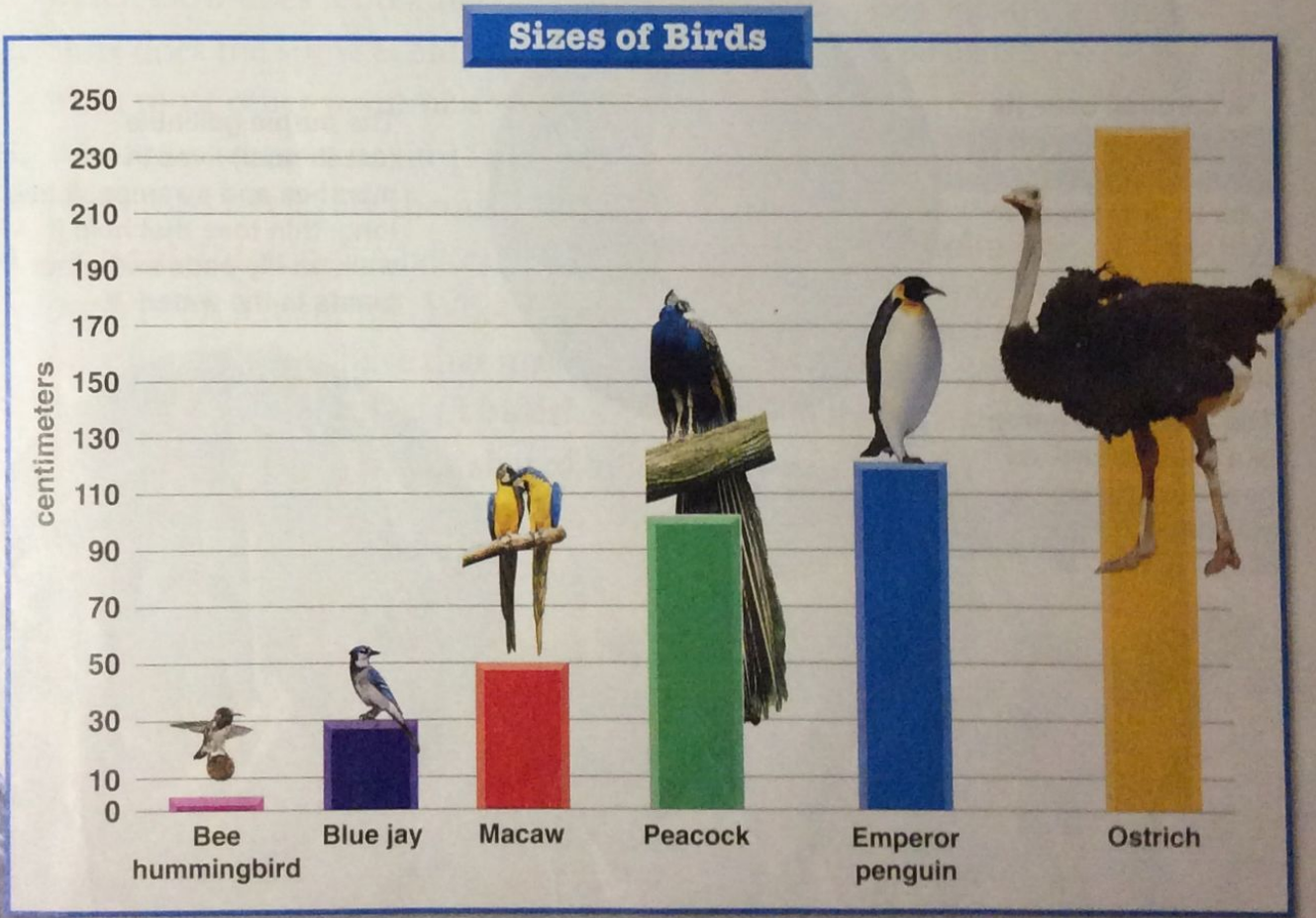
Like mammals, birds have lungs for breathing air. Many birds also care for their young for a while after the young are born. Unlike most young mammals, young birds hatch from eggs.

Feathers cover most of a bird's body. But not all feathers are the same. Some feathers help keep a bird warm. Other feathers help birds fly. For example, the wing feathers of many birds have a shape that helps them fly.

✓ **What are five traits of birds?**



▲ A weaverbird uses leaves and grass to make a hanging nest. The mother bird lays her eggs on soft grass placed inside the nest.



Types of Birds

There are many types of birds. Like mammals, birds are grouped together because of traits they share. The most common traits used for grouping birds are beak shape and foot shape.

Beak shape can be used to tell what kind of food a bird eats. For example, wading birds have long beaks that help them catch fish and dig small animals from the mud.

Foot shape can be used to tell where a bird lives. For example, wading birds have long toes that keep them from sinking into the mud. For some birds foot shape is also important in getting food.

✓ **What can you tell about a bird from the shape of its beak or feet?**

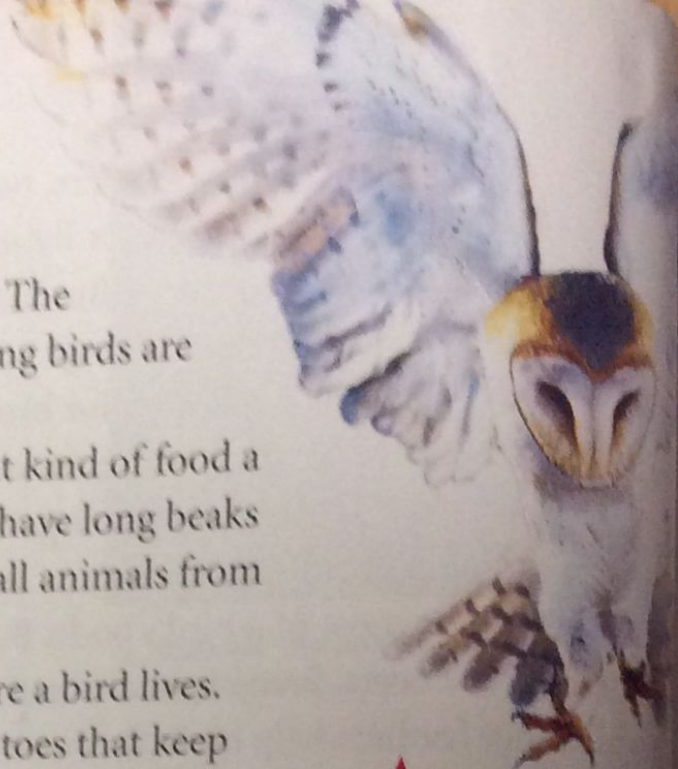
A cardinal uses its beak to eat seeds. It uses its feet to hold on to branches. ▶



The purple gallinule (GAL·ih·nool) lives in marshes and swamps. It has long, thin toes that help it walk on lily pads and other plants in the water. ▼



The great blue heron is a wading bird. Its beak has a shape that is useful for catching fish. ▶



▲ A barn owl catches other animals for food. The feet of a barn owl are useful for catching animals such as mice.

Summary

Mammals are animals that have fur or hair and breathe with lungs. Most mammals also give birth to live young and feed their young with milk from the mother's body. Birds are animals that have feathers, two legs, and wings. Like mammals, birds breathe with lungs. Unlike most mammals, birds lay eggs from which their young are hatched.

Review

1. Name a mammal that lives in the water. How does it breathe?
2. How does the spiny echidna differ from most other mammals?
3. What two features of birds are most often used to classify them? Why?
4. **Critical Thinking** A bat can fly, but a bat is a mammal. What traits do you think bats have that make them mammals instead of birds?
5. **Test Prep** Which trait is shared by birds and mammals?
 - A have feathers
 - B have fur
 - C breathe with lungs
 - D give birth to live young



LINKS



MATH LINK

Interpret Graphs Look at the graph on page A55. Which birds have the longest tails? If the length of the tails were added to the length of the bodies in the graph, which bird would be the longest?



WRITING LINK

Informative Writing—Classification Go bird-watching in your schoolyard, a park, or in your back yard. If possible, use binoculars. Write a description of each bird to share with your classmates. Identify as many birds as you can.



ART LINK

Animal Tracks You can identify many animals by the tracks they make with their feet. Make a collage of tracks. Label each track with the animal's name.



TECHNOLOGY LINK

Learn more about mammals and birds by investigating *Whose Tracks Are These?* on

Harcourt Science Explorations CD-ROM.



What Are Amphibians, Fish, and Reptiles?

In this lesson, you can . . .



INVESTIGATE
how frogs change as they grow.



LEARN ABOUT
amphibians, fish, and reptiles.



LINK to math, writing, technology, and other areas.



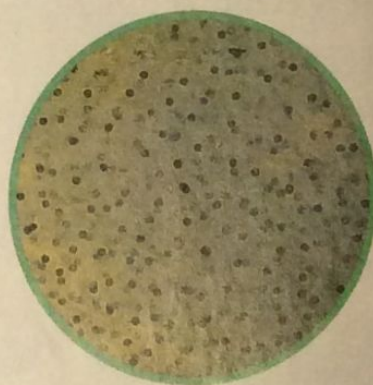
INVESTIGATE

From Egg to Frog

Activity Purpose Frogs lay eggs in the water. When a young frog hatches, it can live only in water. But as the young frog grows, its body changes. The changes get it ready to live on land. In this investigation you will **observe** these changes in real frogs.

Materials

- gravel
- aquarium
- water
- ruler
- water plants
- rock
- tadpoles
- dried fish food



◀ These frog eggs were laid underwater. They will hatch into tadpoles.



◀ Unlike frogs you may know about, this red-eyed tree frog makes its home in trees.

Activity Procedure

- 1 Put a layer of gravel on the bottom of the aquarium. Add 12 cm to 15 cm of water.
- 2 Float some water plants on top of the water, and stick others into the gravel. Add the rock. It should be big enough so that frogs can sit on it later and be out of the water. (Picture A)
- 3 Put two or three tadpoles, or young frogs, in the water. Put the aquarium where there is some light but no direct sunlight.
- 4 Feed the tadpoles a small amount of dried fish food once a day. Add fresh water to the aquarium once a week.
- 5 **Observe** the tadpoles every day. Once a week, make a drawing of what they look like.



Picture A

Draw Conclusions

1. What changes did you see as the tadpoles grew?
2. When the tadpoles began to climb out of the water, what did their bodies look like?
3. **Scientists at Work** Scientists **record** what they **observe**. How did recording your observations help you learn about the growing tadpoles?

Investigate Further How important were the water plants to the growth of the tadpoles? **Form a hypothesis** about this question, and **plan an experiment** to test your hypothesis.

Process Skill Tip

When you **observe**, you use your senses of sight, hearing, smell, and touch. Then you **record**, or write down, your observations.



LEARN ABOUT

Amphibians, Fish, and Reptiles

FIND OUT

- four traits of amphibians
- four traits of fish
- three traits of reptiles

VOCABULARY

amphibian

gills

fish

scales

reptile

Amphibians

In the investigation, you observed that a tadpole lives in water. But as the tadpole grows into a frog, it spends more time out of the water. Frogs are amphibians. **Amphibians** (am•FIB•ee•uhnz) are animals that begin life in the water and move onto land as adults.

Amphibians lay eggs in the water. The eggs stay there until they hatch. Young amphibians live in the water, just as tadpoles do. Most adult amphibians live on land.

Amphibians have moist skin. But most amphibians still stay close to water.

✓ **Name three traits of an amphibian.**



◀ A salamander moves its body from side to side to help its legs move forward.

Newts live in water for part of the year. Then they live on land. ▼



▲ Toads live most of their adult lives on land. Unlike some other amphibians, toads have rough, bumpy skin.



Frog Metamorphosis

A frog changes as it grows from an egg to an adult. The changes it goes through are called *metamorphosis* (met•uh•MAWR•fuh•sis).



Frogs Grow and Change

As you saw in the investigation, young frogs look very different from adult frogs. Young frogs hatch from eggs and begin life in the water. They breathe with gills. **Gills** are body parts that take in oxygen from the water.

As they grow, young frogs change. In time, they form lungs. Once they have lungs, their gills begin to disappear. Then they develop other body parts that help them live on land. Adult frogs spend most of the year on land near water.

✓ **What body parts do young frogs have that adult frogs do not have?**

- 1** A frog lays many eggs at one time. The eggs are covered by a jellylike coating.
- 2** Hatched tadpoles have gills for breathing in water. They also have a tail but no legs.
- 3** As a tadpole grows, lungs begin to form. Back and front legs begin to grow. These parts allow an adult frog to live on land.
- 4** Once the lungs work, the gills and the tail disappear. The adult frog is now ready to live on land.

Fish

Fish are animals that live their whole lives in water. Like young amphibians, fish have gills. The gills are on the sides of a fish's head. The gills take in oxygen as water moves over them.

Most fish are covered with scales.

Scales are small, thin, flat plates that help protect the fish.

Different fish have many different shapes and sizes. Like other animals, some fish eat plants and others eat animals. Most fish lay eggs, but some fish give birth to live young.

✓ **What are two traits of fish?**

Sharks do not have bones. Instead, their skeletons are made of a softer material called cartilage (KAR•tuh•lij). ▼



▲ This Guadeloupe bass has a skeleton made of bone.



▲ This ray has a cartilage skeleton just like a shark, but its body is flat.

Reptiles

Reptiles (REP•tylz) are land animals that have dry skin covered by scales. Because they live mostly on land, reptiles use lungs to breathe air. Reptiles that spend a lot of time in water must come to the surface to breathe air. A crocodile, for instance, often stays in water. But it stays near the surface so its nose and eyes are above the water. This allows the crocodile to breathe and see.

Many reptiles hatch from eggs laid on land. The eggs have a tough, leathery shell. Other reptiles are born live. Either way, most of the young are able to meet their needs as soon as they are born.

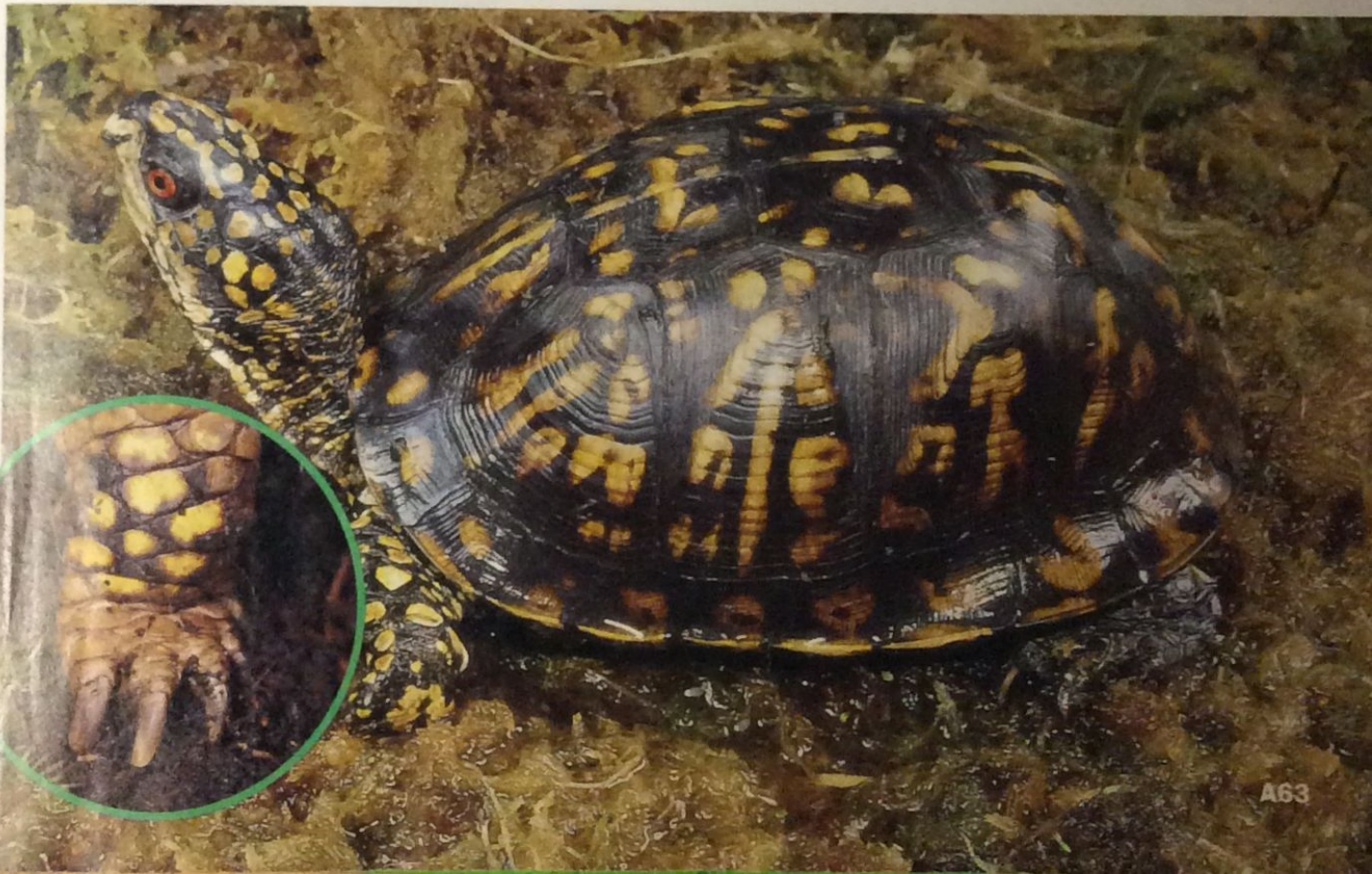
Reptiles are found almost everywhere on Earth except for the coldest places. Many live in warm, wet tropical rain forests or in hot, dry deserts.

✓ What are three traits of reptiles?

The turtle has a hard shell that protects most of its body. The turtle has scales on its body. ▼



▲ The Eastern box turtle hatches from eggs laid on land.



Types of Reptiles

There are three main groups of reptiles. Lizards and snakes are in one group. Their bodies have rows of scales that overlap. Most lizards live in very warm places. They have four legs and long tails. Snakes don't have legs. They move by pushing their bodies against the ground.

Alligators and crocodiles are another reptile group. They live in water a lot of the time. They come out of the water to sun themselves.

Tortoises and turtles make up the third group of reptiles. They are the only reptiles that have shells. Tortoises live on land. Turtles live in water.

✓ What are the three groups of reptiles?

This is an American crocodile. A crocodile can lie very still in the water, with only its eyes and nose above the water. This helps the crocodile catch animals that can't see it. ▼



▲ The boa is a large snake. Like other snakes, it sheds its scaly skin and grows new skin.



▲ The Australian frilled lizard uses a fan-shaped body part to scare away enemies.





- ▲ This is a Galápagos tortoise. Like turtles, tortoises have hard shells that protect them from enemies.

Summary

Amphibians are animals that begin life in water, change in form, and then live on land. Fish live in the water, use gills for breathing, and have body parts that help them swim. Reptiles are animals that are covered with scales.

Review

1. What happens during the metamorphosis of a frog?
2. List three features that help fish live and move in water.
3. What do gills do?
4. **Critical Thinking** Why do many amphibians stay near the water for their whole lives?
5. **Test Prep** Which trait is shared by most fish, amphibians, and reptiles?
 A fins C eggs
 B scales D legs



LINKS



MATH LINK

Using Graphs Take a survey of the kinds of amphibians, fish, and reptiles that people keep as pets. Use a computer graphing program such as *Graph Links* to make a bar graph to show your results.



WRITING LINK

Narrative Writing—Story

What if you were a frog? Write a story for a younger child telling how you change from an egg into an adult.



LITERATURE LINK

Verdi To learn more about a snake called a python, read *Verdi* by Janell Cannon.



ART LINK

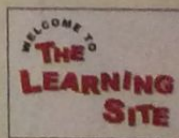
Collage Make a collage that shows adult animals with their young.



TECHNOLOGY LINK

Visit the Harcourt Learning Site for related links, activities, and resources.

www.harcourtschool.com



How Do Animals Behave?

In this lesson, you can . . .



INVESTIGATE
how some animals
blend in with the
environment.



LEARN ABOUT
animal behaviors.



LINK to math,
writing, technology,
and other areas.



How Animals Hide

Activity Purpose Did you ever walk past an animal without seeing it? Some animals can be very hard to see because they blend in with their environment. In this activity you will **make a model** of an insect that is the same color as its environment.

Materials

- construction paper
- crayons or markers
- chenille stems
- scissors
- ruler
- tape
- watch or clock

Activity Procedure

- 1** Choose a place in the room to put your insect. Note the color and shape of the objects in that place. Decide what color and shape your insect should be to blend in.
- 2** Your insect should be at least 5 cm long and 3 cm wide. Use a ruler to draw a rectangle this size. Draw the shape of your insect inside the rectangle. (Picture A)

◀ Can you find the insect in this picture? It is hard to see among the leaves because of its color.

- 3 Color your insect. Use colors and patterns that blend in with the place you chose to put it.
- 4 Place your insect. It should be in full view and not be hidden behind anything. If necessary, use tape to hold it in place. (Picture B)
- 5 When all the insects are placed, ask someone from another class to be a bird. Tell the “bird” to find as many insects as he or she can in one minute. Record in the chart the number found.
- 6 Give the bird another minute to find more insects. Record the number found. Continue until all the insects have been found.



Picture A



Picture B

Draw Conclusions

1. Which insects were found first? How could they have been harder to find?
2. Which insects were found last? Why were they so hard to see?
3. **Scientists at Work** Scientists **observe** animals closely to see how they blend in with their environment. How did observing help you understand how animals' shapes and colors help them to do this?

Process Skill Tip

Before scientists **make a model** of something in nature, they **observe** the object. They use their observations to make their model as accurate as possible.



Animal Behavior

FIND OUT

- different kinds of animal behavior
- ways animals escape from harsh winters
- how animals use colors and shapes to protect themselves

VOCABULARY

instinct

hibernate

migrate

camouflage

mimicry

Types of Animal Behavior

Birds build nests and lay eggs. They keep the eggs warm. When the eggs hatch, the parents feed and defend their chicks. Birds know how to do these things without being taught. Behaviors an animal knows how to do are called **instincts**. Instincts help animals attract a mate and care for young. They help animals defend themselves and find food and shelter.

Animals can also learn behaviors. When a bird eats a bad-tasting insect, it learns not to eat that insect again. A bird that catches a good-tasting insect will try to catch the same kind of insect again.

Many animals learn behaviors from others of their own kind. Lions teach their cubs how to hunt. Birds learn their songs by listening to others of their kind sing.

✓ **Give an example of a learned behavior and an instinct.**

A dog will learn a new trick very quickly if it is rewarded for the behavior.



Hibernation

In the fall the days get shorter and cooler. In cold climates, these changes tell some animals to eat a lot of food. These animals get very fat. Then they go into a deep sleep, or **hibernate**. They do not stir again until spring. When animals hibernate, they are not just sleeping. Their life activities slow down. The animal's body temperature falls. Its heartbeat rate drops, and its breathing slows down.

Why do animals hibernate? In cold weather, animals lose a lot of body heat. They need to eat a lot to stay warm, but food is hard to find in winter. Hibernating is a way of saving energy. It allows an animal to survive on its body fat for months.

✓ Why do animals hibernate?

This chipmunk curls ► into a ball when it hibernates. Its breathing and heartbeat go way down so it can survive on energy stored in its body.



▲ Some bats eat insects, especially mosquitoes, during the warm months of the year. In winter their food disappears. To survive without food, they go into hibernation.





▲ In spring people who live in the northeastern United States await the return of robins from the south.

Migration

Many birds fly south in the fall to spend the winter in warmer places. They return north in the spring to raise their young. These birds **migrate**, or travel from one place to another and back again.

Many kinds of animals migrate. Gray whales spend the winter in warm waters off the California coast. There the mothers give birth to their



▲ Arctic terns are champions at long-distance migration. In summer they nest in the North American Arctic. In fall they fly across the Atlantic and down the coasts of Europe and Africa, all the way to Antarctica. At the end of the Antarctic summer, they fly back to the Arctic.

young. In spring the whales return to the waters off Alaska. Food is plentiful there at that time of year. In fall they swim south again.

Even some butterflies migrate. Monarch butterflies travel from the Eastern United States to warm places in Mexico. There, millions of butterflies rest on trees. When spring comes, they fly north again to lay their eggs.

✓ **Why do animals migrate?**

Caribou

ALASKA

Caribou (CAR·uh·boo) migrate long distances between their summer and winter homes. Their summer range provides a great deal of grass. Here the caribou grow healthy and fat before winter. But the summer range becomes very cold and windy in the winter. Deep snow covers all the food. So in the fall, the caribou migrate to their winter range. Here, there is more food and the weather is milder.

Each caribou herd follows its own migration route. Their routes change from year to year. ▶

CANADA

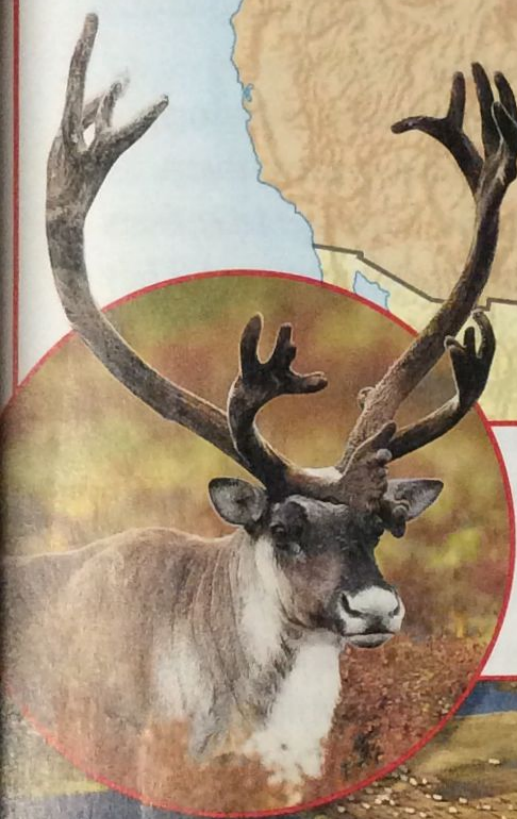
PACIFIC OCEAN

UNITED STATES

ATLANTIC OCEAN

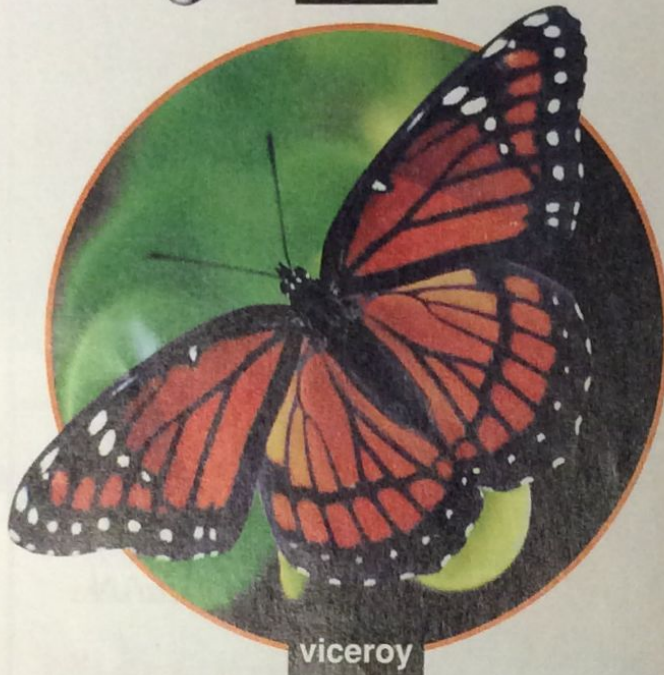
◀ Caribou spend their summers on the Arctic tundra. They migrate farther south in winter.

Large herds, such as the one shown here, leave clear trails as they migrate between their summer and winter ranges. ▼





monarch



viceroy

Octopods use camouflage to catch their meals and to hide from their enemies. The octopus must stay perfectly still, or the effect is spoiled. So behavior is also important to good camouflage. ▼



◀ The monarch butterfly tastes bad to birds. The viceroy butterfly looks like the monarch. This keeps birds from eating it, even though it does not taste bad.

Animal Hide and Seek

Animals have many ways to avoid becoming someone else's dinner. As you found in the activity, some animals can hide in the open. Their colors, patterns, and shapes disguise them from predators or prey. This disguise is called **camouflage**. Camouflage helps animals blend in with their surroundings.

Some animals have warning features that help protect them. Their colorful markings tell others that they are not good to eat. They may have a poisonous sting, or they may taste terrible. Other animals with similar warning colors are not poisonous or bad-tasting. The colors and patterns on their bodies mimic, or look like, the patterns of dangerous or bad-tasting animals. This makes their enemies stay away from them. Imitating something else is called **mimicry**.

✓ What are two ways in which some animals' colors and shapes protect them?

Summary

There are two kinds of animal behavior—instinct and learned behavior. Hibernating and migrating are instincts. A bird learning its song or a dog learning to sit are learned behaviors. Some animals hide from enemies or their prey by using camouflage. Other animals are protected by mimicry.

Review

1. List two examples of instinct and two examples of learned behavior.
2. What happens to an animal's body when it hibernates?
3. Describe two behaviors that animals have that enable them to survive cold winters.
4. **Critical Thinking** A butterfly fish has spots near its tail that look like big eyes. Is this an example of camouflage or mimicry? Explain.
5. **Test Prep** An example of a learned behavior is –
 - A a spider making a web
 - B a dog sitting when you say "Sit."
 - C a bird building a nest
 - D a marmot hibernating



LINKS



MATH LINK

Make a Graph Find out how far four different animals migrate each year. Draw a graph to compare these distances.



WRITING LINK

Narrative Writing – Story

Choose an animal that migrates. Write a story about its yearly journey between its summer and winter ranges.



ART LINK

Camouflage Art Draw a woodland or meadow scene. Add some animals that are camouflaged in the scene.



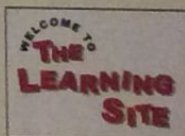
LITERATURE LINK

Amphibian Behavior To find out about all kinds of amphibian behaviors, read *Amphibians* by Stephen Savage.



TECHNOLOGY LINK

Visit the Harcourt Learning Site for related links, activities, and resources.



www.harcourtschool.com

What Is Extinction?

In this lesson, you can . . .



INVESTIGATE
endangered animals.



LEARN ABOUT
living things that
are threatened,
endangered, or
extinct.



LINK to math,
writing, social studies,
and technology.



Endangered Animals

Activity Purpose Over time, the numbers of some animals can become so low that they are in danger of disappearing forever. These animals are called endangered. In this investigation, you will use numbers to predict what might happen to some endangered animals.

Materials

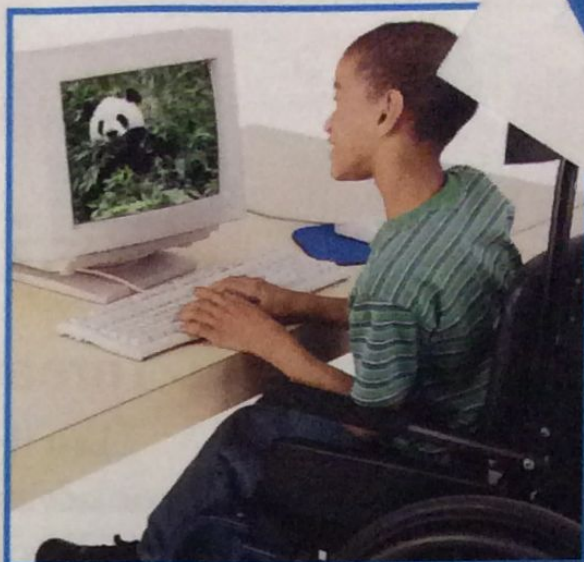
- reference books
- graph paper
- ruler

Activity Procedure

- 1 Find lists of endangered species in reference books or on the Internet. (Picture A)

◀ Zebras are one type of endangered animal.

- 2 Choose five endangered animals from the lists. Look for information about how the numbers of these animals have changed over time. Find out how many of each animal are living now.
- 3 Make a bar graph for your animals. For each animal, draw one bar to show how many were alive 10 years ago. Use a second bar to show how many are alive now. (Picture B)
- 4 **Infer** what will happen in the future to the animals on your graph. Explain your inferences, and share them with the class.



Picture A



Picture B

Draw Conclusions

1. How did **using numbers** help you **organize your data** in this activity?
2. What could happen that would change your prediction? **Record** your ideas.
3. **Scientists at Work** Scientists **use numbers** to help them **organize their data**. They then use their data to make inferences. How did making a bar graph help you make your prediction about the future of the animals?

Investigate Further Animals are not the only kinds of organisms that can become endangered. Find information on five kinds of plants that are endangered, and make a bar graph as you did for the animals.

Process Skill Tip

When you **infer**, you are using what you have observed to explain something that has happened. You can **use numbers** to help you organize data that supports your inference.



Extinction

FIND OUT

- how different species are threatened with extinction
- why animals become extinct
- how some animals are protected from becoming extinct

VOCABULARY

extinct

species

endangered

threatened

fossil

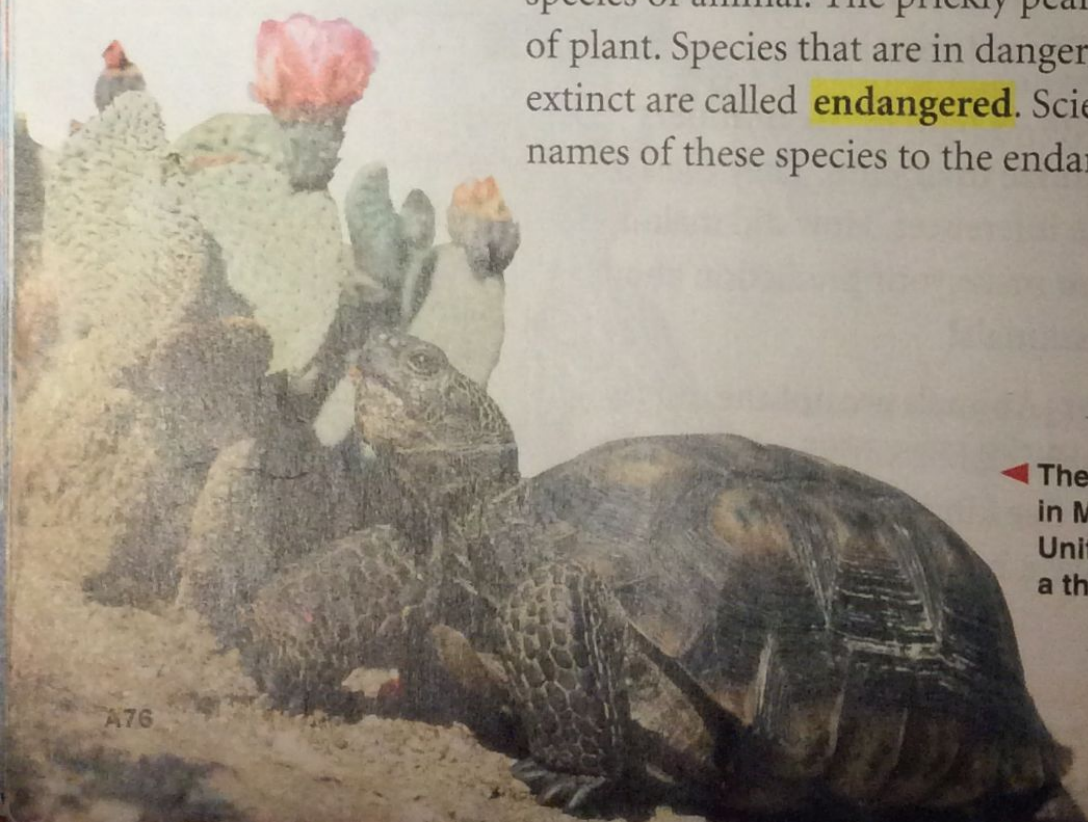
Threatened, Endangered, Extinct

Last time you were outside, did you see any robins or ladybugs? How about oak trees or grass? These animals and plants may be easy to find. Other kinds of organisms are less common.

Although there are billions of ladybugs in the world, some kinds of organisms have only a few hundred members left. When there are only a few hundred individuals of one kind of organism, there is a chance that all of the individuals will die and the organism will become **extinct**. When a plant or animal becomes extinct, it is gone forever.

Each living organism that scientists have identified has its own name. This name identifies a **species** (SPEE•sheez) of organism. The desert tortoise is a species of animal. The prickly pear cactus is a species of plant. Species that are in danger of becoming extinct are called **endangered**. Scientists add the names of these species to the endangered species list.

◀ The desert tortoise lives in Mexico and the southern United States. It is listed as a threatened species.



Before a species becomes endangered, there may be a reduction in its numbers. When scientists notice that the number of organisms is steadily going down, they say that the species is **threatened**. A threatened species is on its way to becoming endangered or extinct.

The desert tortoise is a threatened species. To protect the tortoise, scientists have put it on the threatened species list.

The whooping crane is a bird that lives in wet, swampy areas where it eats snakes and frogs. It is on the endangered species list because only about 150 of the birds are left in the world.

The saber-toothed cat roamed the forests of the world more than a million years ago. It hunted mastodons—giant elephant-like animals. When the mastodons died out, the saber-toothed cat had nothing to eat. Eventually, the cats

Saber-toothed cats have been extinct for thousands of years. ▶



▲ The bald eagle was once an endangered species. In many places, it has been taken off the endangered species list.

became extinct. We know they existed because scientists have found their bones buried in the ground. Evidence of an animal or plant that lived a long time ago on Earth is called a **fossil**.

✓ What does **endangered** mean?



How Animals Become Extinct

Many kinds of animals that once lived on Earth have become extinct. Extinction is a natural process. Over time, some species live while others die out.

Suppose a certain species' environment suddenly changes. Maybe it becomes colder or wetter. Or maybe a new predator moves in or the animal's main food source disappears. How does the species react? It adapts to the new environment, moves to a different environment, or dies.

Although extinction can be natural, often people cause a species to become extinct. Most animals today become extinct because their *habitat*, or the area they live in, is destroyed. When trees and grasslands are cut down to make room for houses and roads, animals that live on the land have to go somewhere else. Sometimes there is nowhere for them to go, and they die.

Most animals know how to avoid predators in their habitats. But when a new predator appears, the animals may not know how to avoid it. In this case, the predator can easily kill many of the animals and may cause their extinction.



◀ The dusky seaside sparrow used to live along the Florida coast. As people started to build houses there, the sparrow's habitat was destroyed. The animal became extinct just a few years ago when the last bird died.



This is exactly what happened in Africa's Lake Victoria. People took a kind of large fish from another part of the continent and put it in the lake. Soon most of the smaller species of fish had been eaten by the new predator. In total, over 200 species of local fish became extinct.

Many animals in the wild are hunted for food or sport. Today, we have laws that tell us which animals

◀ The Caribbean monk seal was hunted to extinction by fishers who thought the seals were eating too many valuable fish.

can be hunted and which cannot be hunted. But a few hundred years ago, these laws didn't exist and people hunted some animals until they were extinct or nearly extinct.

The Caribbean monk seal is an animal that became extinct this way. Because the seals ate fish, fishers saw them as competition. So they killed thousands of the seals. The last monk seal was killed near the coast of Florida in 1922.

Some species become extinct for only one reason. But usually extinction has more than one cause. For example, loss of habitat might reduce a population to very few individuals. This small population could then be easily wiped out by a new predator.

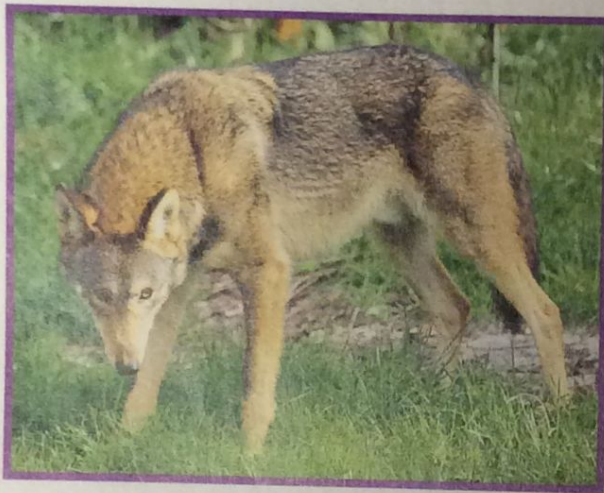
✓ What are the causes of extinction today?

Species Watch

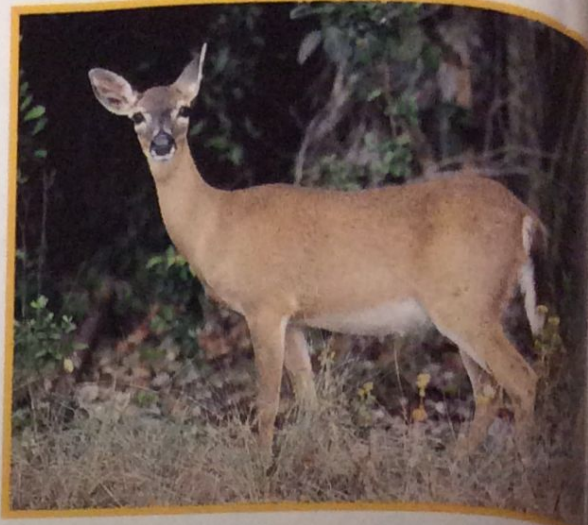
Animals on the endangered and threatened species lists are protected by different laws. Some of the laws prevent the animals from being hunted. Others protect the habitats they live in from being used by humans.

In some cases, the animals do better under the protection of these laws. They are able to reproduce, and their numbers increase until they are no longer endangered.

✓ How do laws protect endangered animals?



▲ Red wolves were killed by people who were afraid of them and by people who didn't want the wolves to eat their sheep. The wolves lived in the woods of the southeastern United States. As time passed, much of their habitat was cleared to make room for houses. The wolves were put on the Endangered Species list in 1967. Then scientists began breeding them and then releasing the young wolves into their natural habitat again.



▲ The Key deer is the smallest deer in North America. It lives on the southern islands of Florida, known as the Keys. As more people move to the Keys, less habitat is available for the deer. Key deer were put on the Endangered Species list in 1967. The deer cannot be hunted and they have land set aside for them to live on.

The grizzly bear is on the threatened species list. The bears live mostly in Canada and Alaska now, where there are fewer people to disturb them. Because of the bears' enormous size, people used to hunt them as trophies. Today, loss of habitat is the main reason for their decline. ▼



Summary

Sometimes species of animals become extinct. Fossils show us that animals that are not on Earth today existed thousands or even millions of years ago. Extinction is sometimes caused by natural changes in habitat. Other times it is caused by people. Some species living today are in danger of becoming extinct. These animals are protected by laws and watched by scientists.

Review

1. How are threatened species different from endangered species?
2. How can people cause animals to become extinct?
3. What can we learn about how animals became extinct by looking at fossils?
4. **Critical Thinking** How can we better protect animals that are threatened or endangered?
5. **Test Prep** What is the main cause of animal extinction today?
A fossils
B hunting
C habitat loss
D weather



LINKS



MATH LINK

Compare Heights Moas, an extinct species, grew to a height of about 4 meters. Today's ostriches are about $2\frac{1}{2}$ meters tall. How much taller was the moa than the ostrich? How much taller is the ostrich than you are?



WRITING LINK

Informative Writing—Report

Find out about an endangered or threatened species that interests you. Write a report for your teacher explaining the factors that are causing its numbers to decline. What laws has the government set up to protect the animal?



SOCIAL STUDIES LINK

The Law Use your media center to find out when the Endangered Species Act became a law.



TECHNOLOGY LINK

To learn more about endangered animals, watch *Endangered Animals* on the **Harcourt Science Newsroom Video** in your classroom video library.



Discovering Animals

No one knows how many kinds of animals there are. New kinds are found every year. There are more than one and one-half million kinds of animals! More than one million kinds of animals are insects. Some scientists think there could be as many as 50 million kinds of animals!

Grouping Animals

People have been observing animals for centuries. New animals are discovered as scientists and explorers go to new places. One of the first people to observe animals and to write about them was Aristotle. He lived about 350 B.C.

He divided animals into two groups. One was made up of animals with a backbone and red blood. This group included horses, cats, dogs, and oxen. The other group did not have a backbone or red blood.

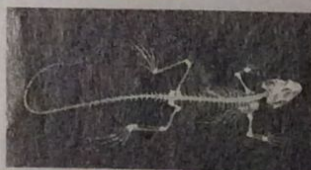
Since then, scientists have discovered that most animals do not have backbones. Clams, spiders, ants, sponges, worms, jellyfish, and squids are all part of this group.

Your senses can mislead you when you study animals. A whale looks like a fish, and it lives in the water. Not until the 1600s did an English scientist, John Ray, observe whales closely. He learned that they are mammals, just as humans are.

The History of Animal Discovery

about 350 B.C.

Aristotle develops a classification system for animals.



1600s

John Ray discovers that whales are mammals.

350 B.C.

1400

1500

1600

1400–1600

Age of exploration—many animals are discovered.

1590

The microscope is invented.



Discovering New Animals

The microscope was invented during the late 1500s. Using this tool, scientists began to discover living things made up of only one cell. In 1665 Robert Hooke published a book of drawings of biological specimens viewed through a microscope.

Scientists today use microscopes to study all kinds of cells. These studies help scientists understand how animals are related to one another.

When explorers during the 1400s through the 1600s traveled to new places, they returned home with animals that had never been seen before. They brought parrots and other brightly colored birds from tropical areas such as South America. They also brought many different kinds of monkeys from those areas. A giraffe from East Africa was sent to China. All of these animals were studied carefully by scientists.

People continue to find and study new animals. Modern explorers search the oceans for unknown

species. We still know very little about animals living at the bottom of the ocean. Thermal vents are places where heat comes from the ocean floor. Many strange creatures live near these thermal vents.

Scientists will continue to explore unfamiliar places, such as rain forests, ocean floors, and volcanoes. Each new place will probably have animals we have never seen before.

THINK ABOUT IT

- How have microscopes helped scientists learn about animals?

1665

Robert Hooke publishes a collection of his drawings.

1700

1900

2000

1977

Animals are discovered living near thermal vents deep in the ocean.



Rodolfo Dirzo

TROPICAL ECOLOGIST



Growing up in Mexico, Rodolfo Dirzo used to watch bugs. That early interest led him to study snails and slugs far away in Wales. After completing his education, he returned to Mexico. He has taught for many years at the Organization for Tropical Studies. He does research on tropical forests. Teaching is one of Dirzo's main interests. He especially wants to interest Latin American students in ecology.

Besides teaching, Dirzo studies two different forests in Mexico. In one, the forest has not been disturbed. There are many kinds of plants and animals. In the other, some of the forest has been cut down. As a result, many of the animals that would be expected to

live there are no longer there. Dirzo compares the two places. He uses his imagination and his training in science to describe what happens to a habitat that has changed. Without animals to help spread seeds and to trample down the vegetation, the forest plants may change. Dirzo expects that there will be fewer kinds of trees without the animals to help provide places for many different plants to grow.

THINK ABOUT IT

1. What might cause animals to leave a forest?
2. How does comparing the two forests help Dirzo analyze his data?

ACTIVITIES FOR HOME OR SCHOOL

SHELL STUDY

Why is a spiral shell larger at one end?

Materials

- safety goggles
- gloves
- spiral shell from an animal such as a whelk, conch, or sea snail
- coarse sandpaper
- hand lens



Procedure

- 1 **CAUTION** Put on the safety goggles and gloves. Observe the outside of the shell. Rub the tip of the shell with sandpaper until you have a hole about 5 millimeters (about $\frac{1}{4}$ in.) wide.
- 2 Use the hand lens to observe the inside of the shell. What do you see?

Draw Conclusions

Animals that live in spiral shells usually keep their shells for their whole lives. When they begin their lives, they are very small. Their shells are very small too.

Think about the shell you observed. Why do you think the spiral is small at one end and gets bigger at the other end?

FEATHER STUDY

What are the parts of feathers?

Materials

- 1 or 2 types of feathers from a bird
- hand lens



Procedure

- 1 Study the feathers. Use the hand lens to look at their parts. Record what you observe.
- 2 Touch the feathers as you look at them. Record what you feel.

Draw Conclusions

Discuss what you know about birds. Think of ways the feathers help birds fly.

Vocabulary Review

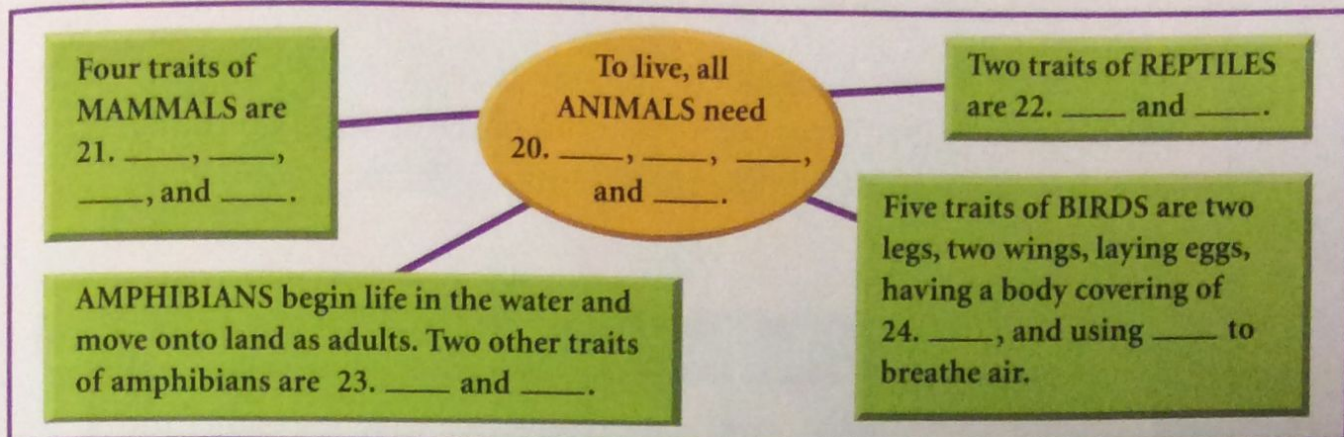
Use the terms below to complete sentences 1 through 19. The page numbers in () tell you where to look in the chapter if you need help.

inherit (A48)**traits** (A48)**mammals** (A52)**birds** (A55)**amphibians** (A60)**gills** (A61)**fish** (A62)**scales** (A62)**reptiles** (A63)**instinct** (A68)**hibernate** (A69)**migrate** (A70)**camouflage** (A72)**mimicry** (A72)**extinct** (A76)**species** (A76)**endangered** (A76)**threatened** (A77)**fossil** (A77)

1. One trait of ____ is a body covering called fur.
2. The features a young animal gets from its parents are called ____.
3. Animals ____ their traits from their parents.
4. Animals that begin life in water and later live on land are ____.
5. Animals ____ to the south to escape the cold winter.
6. ____ have bodies covered with feathers.
7. Reptiles and fish have ____.
8. When one animal looks like another it is called ____.
9. Scales make it easy for ____ to glide through the water.
10. Young amphibians and fish use ____ to take in oxygen.
11. Behaviors that animals know without being taught are called ____.
12. ____ have dry, scaly skin.
13. Evidence of a plant or animal that lived long ago is a ____.
14. An animal that has a color similar to its environment has ____.
15. When all of one kind of organism dies, the organism is ____.
16. If the numbers of an organism are going down, the organism is ____.
17. Animals that sleep through the winter ____.
18. A specific scientific name identifies a ____ of an organism.
19. An ____ species may become extinct.

Connect Concepts

Write the terms that belong in the concept map.



Check Understanding

Write the letter of the best choice.

25. What kind of shelter do beavers build?

A dam C den
B lodge D nest

26. Which kind of animal feeds its young with milk from its body?

F fish H amphibian
G mammal J bird

27. All animals are made of—

A fur C scales
B skin D cells

28. Which kind of animal is a salamander?

F reptile H fish
G mammal J amphibian

Critical Thinking

29. Describe how an animal could become extinct.
30. How are polar bears and bats alike?

Process Skills Review

31. Use what you have learned about animals to **classify** these animals into groups: snake, robin, dog, lizard, cow, goose, whale. Explain why you grouped the animals as you did.
32. Explain how making and **using a model** of a bird's nest can help you learn about birds.
33. How can you use your senses to **observe** birds?

Performance Assessment

Grouping Animals

Use the animal cards from the Investigate in Lesson 1. Group them by using what you have learned about animals. Are there any animals that don't belong in a group? What traits did these animals have?

There are many places where you can discover living things. By visiting the places below, you can find out more about the many kinds of plants and animals found on Earth.



The State Botanical Garden of Georgia

WHAT A preserve set aside for plants and nature by The University of Georgia

WHERE Athens, Georgia

WHAT CAN YOU DO THERE? See the Visitor Center. Explore the gardens, tour each of the garden collections, and learn more about Georgia's endangered plants.

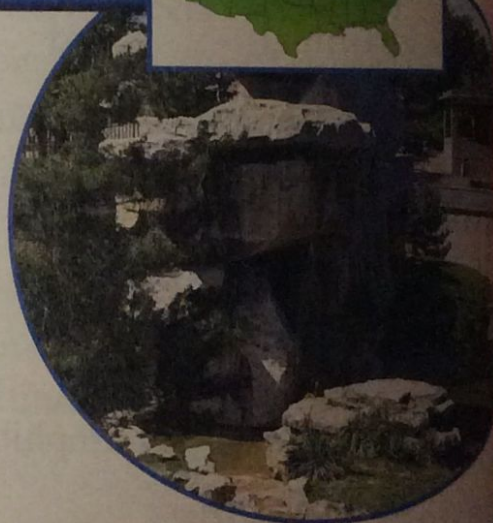


St. Louis Zoo

WHAT A collection of many living animals from around the world

WHERE St. Louis, Missouri

WHAT CAN YOU DO THERE? Explore different exhibits and discover the many animals at the zoo. See mammals, birds, amphibians, reptiles, and more.



Plan Your Own Expeditions

If you can't visit The State Botanical Garden of Georgia or the St. Louis Zoo, visit a garden or zoo near you. Or log on to The Learning Site at www.harcourtschool.com to visit these science sites and other places to observe plants and animals.