

Advanced Level



Life Science

Plant and Animal Adaptation

How Animals Survive

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How Animals Survive

How are animals well-suited to live in their environments?

CORE CURRICULUM STATEMENTS

Individual organisms and species change over time.

Each animal has different structures that serve different functions in growth, survival, and reproduction.

- wings, legs, or fins enable some animals to seek shelter and escape predators
- the mouth, including teeth, jaws, and tongue, enables some animals to eat and drink
- eyes, nose, ears, tongue, and skin of some animals enable the animals to sense their surroundings
- claws, shells, spines, feathers, fur, scales, and color of body covering enable some animals to protect themselves from predators and other environmental conditions, or enable them to obtain food
- some animals have parts that are used to produce sounds and smells to help the animal meet its needs
- the characteristics of some animals change as seasonal conditions change (e.g., fur grows and is shed to help regulate body heat; body fat is a form of stored energy and it changes as the seasons change)

In order to survive in their environment, plants and animals must be adapted to that environment.

- animal adaptations include coloration for warning or attraction, camouflage, defense mechanisms, movement, hibernation, and migration

Organisms maintain a dynamic equilibrium that sustains life.

Animals respond to change in their environment (e.g., perspiration, heart rate, breathing rate, eye blinking, shivering, and salivating).

Some animals, including humans, move from place to place to meet their needs.

Particular animal characteristics are influenced by changing environmental conditions including: fat storage in winter, coat thickness in winter, camouflage, shedding of fur.

Some animal behaviors are influenced by environmental conditions. These behaviors may include: nest building, hibernating, hunting, migrating, and communicating.

Plants and animals depend on each other and their physical environment.

When the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.

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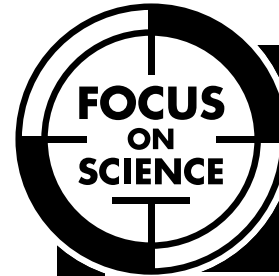
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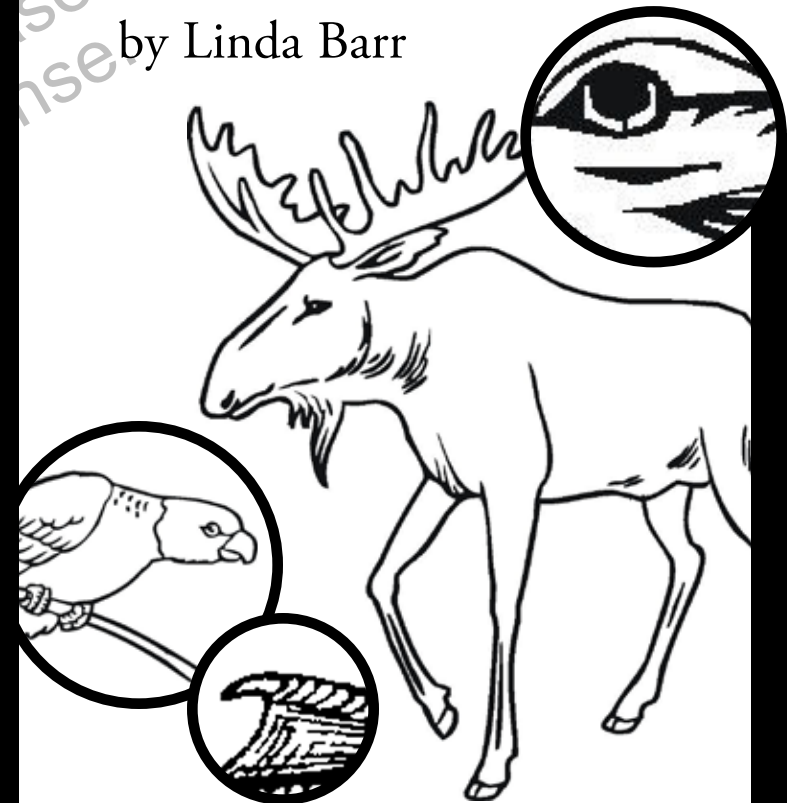


Life Science

Plant and Animal Adaptation

How Animals Survive

by Linda Barr





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Curriculum materials for **your** content standards

Table of Contents

Introduction:

Classifying Animals 4

Chapter 1:

Body Parts for Survival 6

 Fur and Feathers 6

 Fins and Feet 9

 Necks and Tongues 10

 Eyes and Ears 11

 Claws and Teeth 12

Chapter 2:

Behaviors for Survival 14

 Migrating 14

 Hibernating 16

 Hiding 18

 Fighting Back 19

Chapter 3:

Disappearing Animals 20

Glossary 22

To Find Out More 23

Index 24

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INTRODUCTION

Classifying Animals

Millions of animals are born on Earth every year. Scientists classify all these animals into two groups—vertebrates and invertebrates.

Invertebrates are animals with no bones such as spiders, insects, jellyfish, and earthworms. Vertebrates are animals that have cartilage or bones.

Vertebrates can be further divided into two groups—warm-blooded and cold-blooded. A warm-blooded animal is like you and me. It keeps its body temperature the same. A cold-blooded animal doesn't keep its body temperature the same. It changes according to how hot or cold its surroundings are. The chart on the next page describes five different types of vertebrates.

Warm-Blooded Vertebrates	
Mammals	Have hair or fur Breathe air Feed their young milk
Birds	Have wings and feathers Breathe air Lay eggs
Cold-Blooded Vertebrates	
Fish	Have scales, fins, and tails Breathe underwater using gills
Reptiles	Have dry skins and scales Breathe air Lay eggs
Amphibians	Have smooth, wet, or slimy skin Spend part of their life in water and part on land

What helps all these animals survive? You and every animal have the same basic needs—food, water, oxygen, space, and shelter.

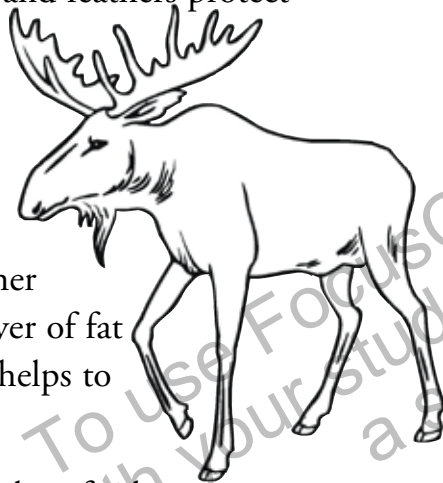
It's not easy for animals to meet these basic needs. However, many of them have special body parts that help. They also behave in ways that help them get what they need from their environment. In this book, you will find out ways that animals meet their needs in order to **survive**.

survive: to remain alive

Body Parts for Survival

Fur and Feathers

Body coverings help animals survive in many ways. For example, fur and feathers protect them from icy weather. Many animals that live in cold climates, such as moose, have one or two layers of thick fur. Walruses, seals, and other animals have a thick layer of fat under their fur. It also helps to keep in the warmth.



Birds often fluff up their feathers when the cold winds blow. Fluffy feathers trap air, like a sleeping bag. Their bodies warm the trapped air, which helps keep them warm.

–Transfer–
How does your body covering help you survive?

The desert is very dry, so the animals living there must be able to survive with very little water. The scales covering snakes and lizards help keep the water in their bodies from evaporating into the air.

Body coverings also help hide animals from **predators**. Many birds and insects are green or brown. They blend in with their surroundings. That makes it harder for hawks and other predators to spot them. The Arctic hare, which looks like a rabbit, is brown much of the year. In winter, its brown fur is replaced by white fur to match the snow and help the hare survive.

Body coverings help predators sneak up on their **prey**, too. Wolves and many other predators are colored like their surroundings. That makes it harder for their prey to see them coming.

predator: an animal that eats other animals; examples: lion, wolf, hawk

prey: an animal that is eaten by other animals; examples: mouse, rabbit, bird

Body coverings can also protect animals from predators. Have you ever seen an armadillo? It is covered with bony plates that most predators cannot bite through. Porcupines are covered with sharp quills. A turtle can pull its head and legs inside its hard shell.

Insects, snails, clams, lobsters, and many other animals also have shells or hard body coverings. These animals are invertebrates. They do not have bones. Instead, their shells or body coverings protect and support their bodies.

Body coverings make some animals look like other animals. The monarch butterfly tastes bad to birds, but the viceroy butterfly tastes good. However, a viceroy looks like a monarch. Birds cannot tell them apart, so they do not eat either kind.

An insect's shape can fool predators, too. For example, the walking stick insect looks much like a twig.

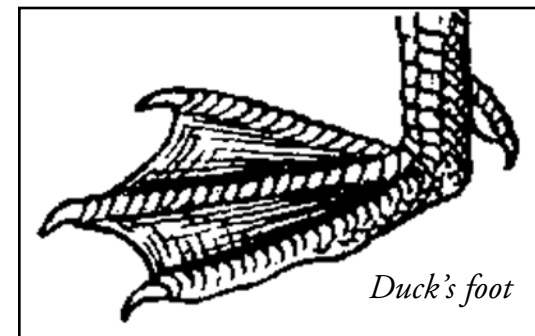
*–Summarize–
Describe the ways that body coverings
help animals survive.*

Fins and Feet

To survive, animals often try to swim, run, or fly away from their predators. Still, different types of predators have fins, feet, and wings, too. These parts help them catch their prey, which they need to survive.

Some animals have special fins or feet. For example, flippers help whales and sea lions dive deep into the water. Webbed feet help frogs and ducks swim fast. Long toes help birds hold on to tree branches. Monkeys can use their hands and feet to swing from branch to branch.

Deer and other animals have hooves that protect their feet. Special hooves help bighorn sheep scramble up slippery mountain cliffs. Large back legs help rabbits and kangaroos out-hop their predators.



Duck's foot

Necks and Tongues

Giraffes have long necks that allow them to reach the highest leaves on the trees. Sometimes those are the only leaves left after antelopes and other plant-eaters have eaten their fill.

Giraffes also have long tongues. Their tongues let them reach even farther to get the leaves—or bugs—they want to eat. Snakes use their tongues to bring smells and tastes inside their mouths. An octopus doesn't have a tongue and tastes things with its **tentacles**. Then it does not have to get close to see if something is good to eat—or dangerous.

Elephants use their trunks to grab food. Anteaters use their long noses and long, sticky tongues to capture ants. Animals have many special parts to help them eat!

tentacle: a long, thin, flexible arm that can reach out and grab things; found on octopuses and squid

Eyes and Ears

Hawks can spot mice while flying far above them. Sharp eyesight helps many predators find food. It also helps prey see predators in time to get away.

Many animals can hear really high or really low sounds. People cannot hear these sounds. This “super hearing” helps animals know when predators are tiptoeing toward them. Mice can hear the whoosh of a hawk's wings! Of course, the hawk can also hear the mice as they try to scamper away.

Some animals can feel prey or predators getting closer. For example, ants can feel movement through two inches of soil. Hairs on grasshoppers help them feel movement in the air. Crabs have hairs on their claws that help them feel movement in the water.

–Connect–

How do your eyes and ears help you survive?

Claws and Teeth

Claws and teeth help animals protect themselves and eat their food. Wolves have sharp teeth for catching and eating their prey. Cows have strong, flat teeth for grinding up tough grasses. Like a wolf, you have sharp teeth for biting. Like a cow, you have flat teeth for chewing.

Sharks have super-sharp teeth to catch and eat their prey. Their teeth fall out easily, however, so they grow new ones. One shark might have 20,000 teeth during its life. Dolphins have more teeth at one time than any other animal—200! Instead of teeth, baleen whales have a strainer in their mouth that traps small fish.

Different birds have different types of beaks so they can eat different kinds of food. You can see some of these beaks on the next page.

–Apply–

A scientist finds a new type of bird. Why must this scientist describe the bird's beak very carefully?

Beaks and Bills

Eagle

Eagles and hawks have strong, sharp beaks. These beaks help them catch and eat small prey.



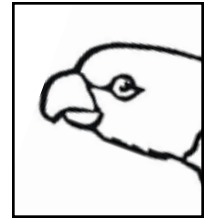
Woodpecker

Woodpeckers and many other birds eat insects. They need pointed beaks to reach the bugs crawling under tree bark.



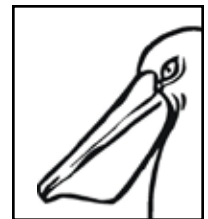
Parrot

The parrot's strong, curved bill helps it open seeds and nuts.



Pelican

Pelicans store fish in their large bills so they can feed their babies.



Behaviors for Survival

Migrating

With a thick coat of fur and fat, some animals can survive the coldest weather. However, when fall turns into winter, other animals must change their behavior or they will not survive the cold days ahead.

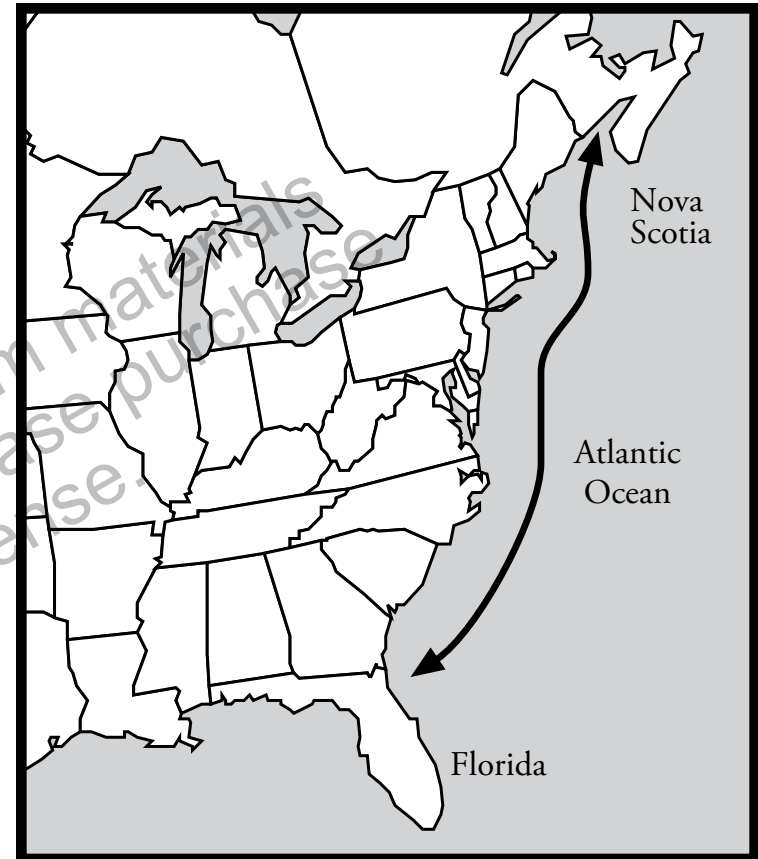
When the weather gets chilly, many animals leave the region. The plants or animals they usually eat will soon be hard to find. They cannot keep warm enough to survive icy weather, so they migrate to a warmer place. For example, many kinds of birds head to warmer areas for the winter. Some animals, such as whales, migrate partly to have their babies in warm places. Then they and the babies swim north again.

—Propose—

What types of investigations do you think scientists use to learn about the migration of whales?

migrating: traveling from one place to another and back again

The Migration of the Right Whale



The right whale was named because it was the “right” one to hunt. It is slow and big. Because of hunting, few right whales survive. Every fall, the ocean near Nova Scotia in Canada gets very cold. The northern right whales leave and swim all the way to the coast of Florida. In the warm water there, they have their babies. In the spring, these whales migrate back to the waters of Nova Scotia.

Hibernating

Some animals survive winter by sleeping through it. First, they eat a lot of food to store fat in their bodies. Next, they find a safe place, such as a hole in a tree or in the ground. Then they go into a deep sleep.

As an animal hibernates, its heart slows way down. Its body gets cooler, just above freezing. It breathes less often. Its body uses energy from the stored fat to stay alive.

Hibernators include small animals, such as certain kinds of mice, chipmunks, ground squirrels, and bats. If these animals did not hibernate, they would starve or freeze to death. Yet if the temperature drops too much, the hibernators wake up. They move around a little to keep from freezing.

–Evaluate–

Why don't all animals hibernate during the winter?

hibernating: going into a very deep, sleep-like state for a long while

Some animals seem to hibernate during the coldest months, but they don't go into a deep sleep. Instead, they go into a **dormant** state. Most bears crawl into a den, and frogs dig into the mud. Some snakes go dormant, too. Going dormant also helps some animals survive the hottest, driest weather in the desert.

While animals are dormant, their hearts slow down. They breathe a little less often. Their bodies cool off, but not as much as hibernating animals. Dormant animals wake up once in a while during winter. They might move around and even eat on warm days. Some mother bears have babies and nurse them while they are dormant.

Don't poke a dormant bear! It might wake up quickly—and be very hungry!

–Distinguish–

What is the difference between hibernating and being dormant?

dormant: a state of being alive but not moving or growing

Hiding

You know that some body coverings help animals **camouflage** themselves, or blend in with their surroundings. Behaviors help them blend in, too. For example, chameleons can change color. Their skin has four colors of “paint” in it—red, yellow, blue, and white. Let’s say a brown chameleon rests on a green leaf. The yellow cells in its skin grow larger than the blue cells under them. This turns the chameleon green. It can change color in 20 seconds!

Other animals hide by standing still. Then many predators do not see them. Opossums and many kinds of snakes pretend to be dead. They lie very still. They let their mouths fall open and do not move. After the predator leaves, the animal quickly hurries to safety.

—Predict—

What is an animal’s risk of pretending to be dead?

camouflage: to disguise in order to hide

Fighting Back

Many animals survive by fighting their predators. Many of them use their teeth, claws, wings, or feet. Sheep and goats use their horns, while moose and elk use their antlers. Some animals, such as wasps and jellyfish, sting. Others, such as skunks, weasels, and some snakes, use smell to chase predators away. Porcupines can shoot their quills at predators.

Some animals, such as the puffer fish, make themselves look larger to scare off predators.

Others make a lot of noise. Have you ever heard two cats fight? They are using noise to try to scare each other.

Like you, animals must meet their basic needs, or they will not survive. Like you, they use their body parts and behaviors to stay alive.

Disappearing Animals

Animals adapt to their environments to survive. But what happens when a drastic change occurs in the environment?

Sometimes animals cannot adapt and they move to a new location. However, if they are not able to relocate, they will die.

In recent years, the number of orca whales living off the coast of Washington has declined. Salmon is their main food source. But people have overfished—or taken too many fish out of the water. The whales do not have enough to eat.

Orcas are facing other threats, too. One of these is noise pollution, or sound that is harmful. Orcas use their sense of hearing to find prey. But boats, ships and other human activities are adding noise to the water. This noise makes it more difficult for orcas to locate food. It also affects the orcas' ability to communicate with each other.

It is not always easy to know why an animal population declines. For the past 20 years, scientists have studied the frogs, toads, and salamanders in the Sierra Nevada Mountains. They have discovered that the numbers of these animal populations have been dropping quickly. These animals have survived on Earth since before dinosaurs. Why are they disappearing now? Here are some questions scientists are asking:

- Are the populations of frogs, toads, and salamanders really declining, or is it a natural cycle occurring?
- Are people involved somehow in the decline of these animals? Have our actions made it difficult for them to survive?
- Have natural causes changed these animals' habitat in recent years?
- If their habitat has changed, how are these animals affected by the change?
- What can be done to stop the trend in declining populations?

Glossary

camouflage—to disguise in order to hide

dormant—a state of being alive but not moving or growing

hibernating—going into a very deep, sleep-like state for a long while

migrating—traveling from one place to another and back again

predator—an animal that eats other animals; examples: lion, wolf, or hawk

prey—an animal that is eaten by other animals; examples: mouse, rabbit, or bird

survive—to remain alive

tentacle—a long, thin, flexible arm that can reach out and grab things; found on octopuses and squid

To Find Out More . . .

Want to learn more about how animals survive?

Try these books

Amazing Arctic Animals by Jackie Glassman. Grosset and Dunlap, 2002.

Armor to Venom: Animal Defenses by Phyllis J. Perry. Franklin Watts, 1998.

Claws, Coats, and Camouflage by Susan E. Goodman. Millbrook Press, 2001.

How Do Animals Adapt? by Bobbie Kalman. Crabtree, 2000.

What Are Camouflage and Mimicry? by Bobbie Kalman. Crabtree, 2001.

What Do Animals Do in Winter? by Melvin and Gilda Berger. Ideals, 1995.

What Is Migration? by John Crossingham and Bobbie Kalman. Crabtree, 1997.

Access this Web site

Amazing Animal Senses
<http://faculty.washington.edu/chudler/amaze.html>

Index

animal senses, 11
basic needs, 5
bird beaks, 13
body coverings, 6–8, 18
hibernating, 16, 17
invertebrates, 4
migrating, 14, 15
vertebrates, 4–5

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Assessments

How Animals Survive

Print pages 20–22 of this PDF for the assessments.

Check Understanding

Shade the circle next to the correct answer or write your answers on the lines provided.

1. The picture below shows a pelican.



Which statement explains why the pelican has a large bill?

- Ⓐ It allows the pelican to store fish.
- Ⓑ It allows the pelican to break open seeds.
- Ⓒ It allows the pelican to stay warm in winter.
- Ⓓ It allows the pelican to reach the highest leaves in a tree.

2. Some animals survive by resting in very cold or very hot weather. During this time, they are alive but not moving. This behavior is called

- Ⓐ using camouflage
- Ⓑ hibernating
- Ⓒ migrating
- Ⓓ going dormant

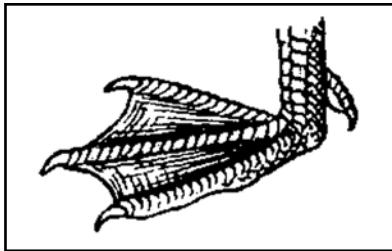
3. A porcupine uses its quills for

- Ⓐ camouflage
- Ⓑ hibernation
- Ⓒ migration
- Ⓓ protection

Check Understanding

Shade the circle next to the correct answer or write your answers on the lines provided.

4. The picture below shows a webbed foot.



This adaptation helps the animal to

- Ⓐ fly
- Ⓑ swim
- Ⓒ run
- Ⓓ jump

5. Identify the **two** groups that scientists use to classify all animals.

- (1) _____
- (2) _____

6. Explain **one** reason why hawks have sharp eyesight.

7. Describe **two** reasons why animals migrate during winter.

(1) _____

(2) _____

Assessment Scoring Guidelines

1. Answer A is correct.
2. Answer D is correct.
3. Answer D is correct.
4. Answer B is correct.
5. Vertebrates
Invertebrates
6. Sharp eyesight helps them see their prey.
7. Some animals migrate to find food.
Some animals migrate to give birth.
Some animals migrate to keep warm.

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English Language Arts Activities

How Animals Survive

Print pages 24–28 of this PDF for the reading activities.

Use Context Clues

TRY THE SKILL

Some words have several meanings. You can use context clues to decide which meaning is being used in a certain sentence. For example, the word *spot* can mean “a mark,” and *spot* can mean “to notice something.”

Read the sentence below and decide which meaning is being used here.

The spots on a giraffe help it blend in with its surroundings.

In this sentence, *spots* means “marks.” The context—the rest of the sentence—tells you which meaning is being used.

Read each word and its meanings. Then read each sentence and write the letter of the correct meaning on the line.

- stick** A. a short, thin piece of wood
B. to attach something to a surface

1. One kind of insect looks just like a ____.

- right** A. correct B. the opposite of left

2. Long ago, people thought that one kind of whale was the ____ one to hunt.

- long** A. tall B. a lot of time

3. An animal that cannot find enough food will not live ____.

- fly** A. to travel through the air B. an insect

4. A ____ has many lenses in its eyes to help it see predators.

- lie** A. something untrue B. to rest on a flat surface

5. To fool predators, some snakes ____ still and pretend to be dead.

Prefixes

TRY THE SKILL

Prefixes are groups of letters that are added to the beginning of a base word. They change the meaning of the word. Here are three common prefixes that you must know.

un- meaning “not”: unsure, unhappy, uncover

re- meaning “again”: replace, reproduce, return

pre- meaning “before”: prefix, prepare, prevent

Understanding these prefixes can help you figure out the meanings of new words.

To practice, read each definition. Then shade the circle next to the word that matches it. Pay attention to the prefixes.

1. Making up your mind before you have all the information you need
 - Ⓐ prejudice
 - Ⓑ retrieve
 - Ⓒ unnecessary
 - Ⓓ regretful

2. Remembering something that happened in the past and feeling sad about it

Ⓐ retrieve

Ⓑ prejudice

Ⓒ undecided

Ⓓ regretful

3. Something that is extra and not required

Ⓐ regretful

Ⓑ undecided

Ⓒ unnecessary

Ⓓ retrieve

Think of more words that use the prefixes *un-*, *re-*, and *pre-*. Write them on the lines. Use a dictionary for help.

Predict the Content of a Book

TRY THE SKILL

Nonfiction books, such as this one, begin with a table of contents. This table lists the titles of the chapters. The titles tell you which topics the book covers.

Look at the table of contents on page 3 of this book. It tells you the topics covered in the book. You see that one chapter describes body parts that help animals survive. The next chapter describes behaviors that help animals survive. The chapter titles are followed by subheadings. These subheadings tell more about what each chapter covers. Chapter 1, for instance, describes fur and feathers, fins and feet, and other body parts.

Study this table of contents from a book about giraffes. Then answer the questions.

	Page
Chapter 1: What Giraffes Look Like	4
Height and Weight	5
Patterns of Spots	7
Chapter 2: Where Giraffes Live	9
Chapter 3: How Giraffes Form Families	14
Finding Mates	16
Taking Care of Babies	18
Chapter 4: How Giraffes Protect Themselves	22
Chapter 5: How People Are Helping to Protect Giraffes	24

- Which of these is not a main topic in this book?
 - Where giraffes live
 - How giraffes form families
 - Taking care of babies
 - How giraffes protect themselves
- Which chapter tells whether you should expect to see giraffes in Africa?
 - 1
 - 2
 - 3
 - 4
- Which chapter tells about giraffes' predators?
 - 2
 - 3
 - 4
 - 5

Create a Graphic Organizer

TRY THE SKILL

A T-chart is a graphic organizer that can help you organize information. When facts are organized, they are easier to remember. For example, look at the T-chart below. Notice the two headings. They tell the two main categories of information.

Body parts that help geese survive	Behaviors that help geese survive
<ul style="list-style-type: none"> • webbed feet for swimming • strong wings for flying and fighting off predators • feathers to keep them warm 	<ul style="list-style-type: none"> • migrating to avoid the coldest part of winters • taking care of and protecting their babies so they survive • honking loudly to scare predators

Use the words and phrases below to complete this T-chart. Using the chart about geese as a model, organize ways that bears help themselves survive. Begin by filling in headings for your chart.

hibernating sharp teeth eating other food if a favorite one is hard to find	thick fur raiding garbage cans climbing trees sharp claws
---	--

Answer Key

Use Context Clues

1. A
2. A
3. B
4. B
5. B

Prefixes

1. A
2. D
3. C

Predict the Content of a Book

1. C
2. B
3. C

Create a Graphic Organizer

Body parts that help bears survive	Behaviors that help bears survive
thick fur, sharp claws, sharp teeth	hibernating, eating other food if a favorite one is hard to find, raiding garbage cans, climbing trees