Advanced Level

FOCUS ON SCIENCE

Life Science

Plant and Animal Adaptation

How Plants Survive

LOOK INSIDE FOR:

- Core Curriculum Covered
- Student Book
- Assessments and Reading Activities

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How Plants Survive

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

CORE CURRICULUM STATEMENTS

Individual organisms and species change over time.

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

- roots help support the plant and take in water and nutrients
- leaves help plants utilize sunlight to make food for the plant
- stems, stalks, trunks, and other similar structures provide support for the plant
- some plants have flowers
- flowers are reproductive structures of plants that produce fruit which contains seeds
- seeds contain stored food that aids in germination and the growth of young plants

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

- seeds disperse by a plant's own mechanism and/or in a variety of ways that can include wind, water, and animals
- leaf, flower, stem, and root adaptations may include variations in size, shape, thickness, color, smell, and texture
- animal adaptations include coloration for warning or attraction, camouflage, defense mechanisms, movement, hibernation, and migration

Organisms maintain a dynamic equilibrium that sustains life.

Plants respond to changes in their environment. For example, the leaves of some green plants change position as the direction of light changes; the parts of some plants undergo seasonal changes that enable the plant to grow; seeds germinate, and leaves form and grow.

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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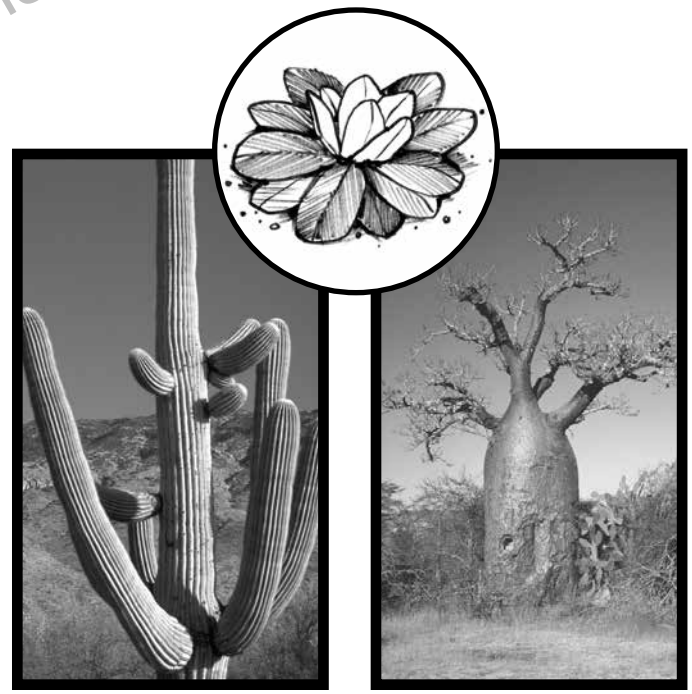
Plant and Animal Adaptation

How Plants Survive

by Stan Hall



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Life Science

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Curriculum materials for **your** content standards

Table of Contents

– Predict –
What do you think you will learn from reading this book?

INTRODUCTION

What Do Plants Need?

Plants are everywhere! There are about 350,000 different kinds of plants in the world. Many thousands of plants can be found just in New York.

Plants take many forms. Trees and bushes are plants. Grasses are plants. Wildflowers and weeds are plants. Even the fruits and vegetables you eat are parts of plants.

Plants have many of the same basic needs as you—food, water, air, and light. The sun is important for all living things. We depend on plants to **survive**, and plants depend on the sun.

– Reflect –
What kinds of plants live near your home?

survive: to remain alive

Plants have special **structures** that help them meet their needs. They can also change in ways that help them get what they need.

Scientists believe that land plants have been on our planet for 430 million years. Plants have been **adapting** and surviving for all that time. In this book, you will find out what helps ordinary and incredible plants survive.

Plants have the same basic needs as you—food, water, air, and space.

structure: a part of an organism
adapting: changing to fit into a new situation

CHAPTER 1

Structures for Survival

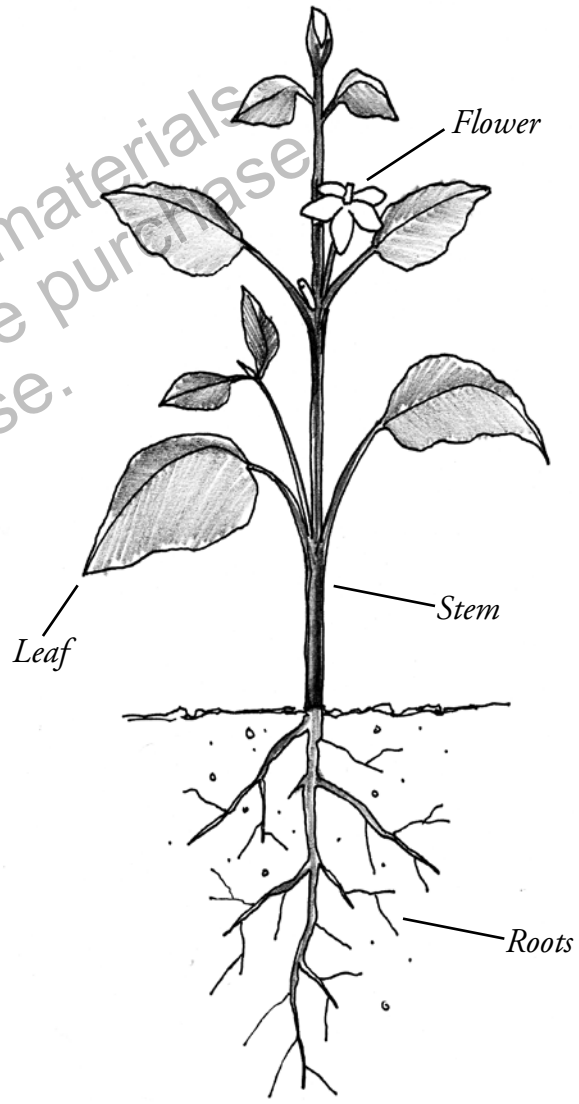
In this chapter, you will learn about the different structures of a plant. Each structure has special **functions** that help the plant survive.

Structure	Function
Roots	• Holds plants in place • Takes nutrients from soil and water
Stems, Stalks, and Trunks	• Carries nutrients and water to other parts of plants • Support other parts of plants
Leaves	• Takes energy from sunlight to make food for plants
Flowers and Seeds	• Makes new plants through reproduction

– Connect –
What are some body structures that help you survive?

function: what an organ, body part, or structure does

Structures of Plants



Roots

Roots are structures that push down into the soil to hold the plant in place. As a plant grows, the roots go deeper into the ground. This makes the plant stronger. During a windstorm, a tree with deep, thick roots has a better chance of survival. Newer trees might be knocked over or torn from the ground because they have **shallow**, thin roots.

You can see the beginnings of roots on many large, old trees like oaks and maples. Some old trees lining city sidewalks have roots big enough to break concrete and push up the sidewalk!

Not every root is completely in the ground where you can't see it. Many tropical trees have thin roots above the ground that help keep the tree upright in the thin, wet soil.

Roots have another important function. They suck up nutrients and water from the soil to feed the plant.

Roots change to adapt to their environment. Plants in the desert usually have the deepest roots. The weather is hot and dry and water is deep under the ground.

shallow: measuring little from bottom to surface

Many roots can be eaten. Some of the vegetables you eat are roots. These include carrots, radishes, parsnips, sweet potatoes, yams, and ginger.

Survivor Plant: Acacia Tree

Workers were digging a well in the Kalahari Desert in Africa. They found that roots of a kind of Acacia tree measured up to 220 feet deep in the ground. That is as tall as an 18-story building!

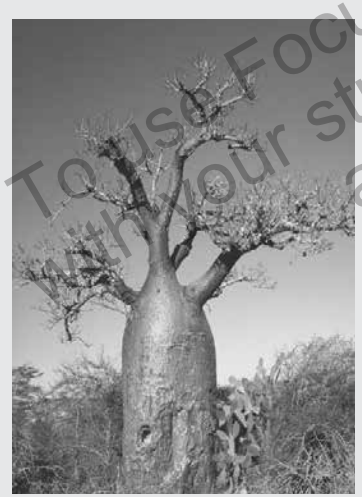
– Evaluate –
Why don't desert plants have shallow roots?

Stems, Stalks, and Trunks

Tomato plants have stems. Corn plants have stalks. Trees have trunks. These structures have different names but serve the same purpose. Stems, stalks, and trunks carry the nutrients and water sucked up by the roots to other parts of the plant. They also carry food down from the leaves. These **sturdy** structures also support other parts of the plant such as leaves, flowers, and seeds.

Survivor Plant: Baobab Tree

These huge trees live on dry, hot grasslands in Africa. Baobab trees have thick trunks that can store thousands of gallons of water. Baobab trees can live for more than 1,000 years.



sturdy: strong; tough

Think about crunchy celery sticks. The stalk, the part you eat, has an important function. The stringy bits of the stalk are the water pipes. When the celery plant is growing, water and nutrients passes from the soil to the leaves growing above the soil.

Many other foods you eat are stems or stalks. These include asparagus, rhubarb, radish, and sugar cane. Potatoes grow underground, but the part of the plant you eat is a stem.

Survivor Plant: Saguaro Cactus

The long arms of a giant saguaro cactus are stems. The desert has very little rain, so the saguaro's stems store every drop of water it can get.

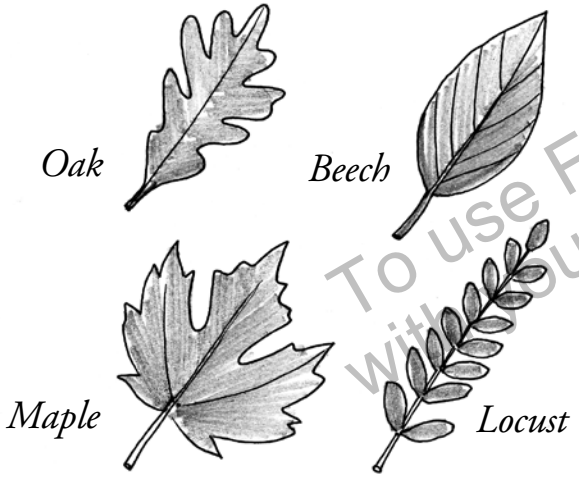
– Connect –

How do your eyes and ears help you survive?

Leaves

Most plants produce their own food. Leaves take energy from sunlight to help make the food the plant needs. This **process** is called photosynthesis.

Leaves have many different shapes and sizes. The spines of a cactus are leaves! Most leaves are flat so there is more area for taking in sunlight. They are thin, so sunlight can easily enter. Here are examples of just a few kinds of leaves.



– Distinguish –
Describe how some leaves look different from others.

process: a series of actions that make something happen

Leaves are important for the survival of animal life, including humans. Leaves are a major part of the human **diet**. Nearly 1,000 kinds of plants have leaves that are **edible**. Lettuce, spinach, kale, and chard are just a few examples of leaves you can eat.

Survivor Plant: Amazon Water Lily

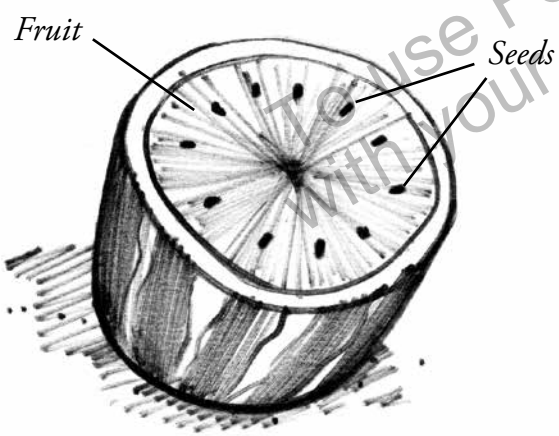
The Amazon water lily of South America is the largest of all known water plants. The water lily's leaves are up to seven feet wide! The leaves' huge size allows the rest of the plant, which is in deep, muddy water, to take in more sunlight in order to survive.

diet: what an organism eats and drinks
edible: can be eaten

Flowers and Seeds

Some plants have flowers. Flowers have many different sizes, shapes, colors, and smells. While flowers are often beautiful, they also have an important purpose for many kinds of plants. Flowers are the **reproductive** structures of plants that produce fruit. Fruit contains seeds.

Think about eating a watermelon with its red, juicy flesh and black seeds. When the flower of the watermelon plant dies, the fruit grows. The fruit gives the seeds the food they need to grow into a new plant.



reproductive: produces new life

Nuts are seeds. Animals like squirrels help plants reproduce by carrying seeds to other places. The seed contains stored food that helps it **germinate** and grow. A seed that a squirrel buries can grow into a tree.

Some animals don't even know they are carrying seeds. Some plants have burrs, which are seeds with a prickly covering. Burrs get stuck in an animal's hair or fur. The animal carries the seed to a new place where it falls off and grows.

Seeds **disperse** in other ways. They drop off the plant to the ground. Then they can also be carried by the wind or water.

– Predict –
What might happen to a sunflower seed blown by the wind to a meadow?

germinate: to begin to sprout
disperse: to go in different directions

CHAPTER 2

Adapting to Survive

Plants change as their environment changes. They must adapt to the climate where they live. Leaves, flowers, and stems are always moving because of changes in their environment.

Leaves take in energy from sunlight. When Earth turns, the position of the sun changes. The leaves of some green plants turn toward the sun to capture more sunlight.

Survivor Plant: Giant Groundsel

The weather is extremely cold at night on top of Africa's Mount Kenya. The giant groundsels that grow there unfold thick leaves during the day to take in sunlight. The plants fold in the leaves at night to stay warm and survive.

Parts of plants go through changes in different seasons in order to grow. In New York, you see this a lot because the state has many deciduous trees. Deciduous means "falling off." When you rake leaves, the leaves come from deciduous trees.

In the autumn, the green leaves on deciduous trees turn red, orange, and gold. Then the leaves fall to the ground before winter begins. The trees rest and barely grow during the cold months. The trees are adapting to **conserve** their energy.

The weather becomes warmer as spring rains arrive. The trees start to bloom, some with big beautiful flowers. Others have tiny flowers that are hard to see. Seeds come from these flowers, providing food for animals. Leaf buds open. Then the leaves unfold, using sunlight to make food for the trees.

In the hot summer months, leaves are green. Then autumn returns and the **cycle** begins again.

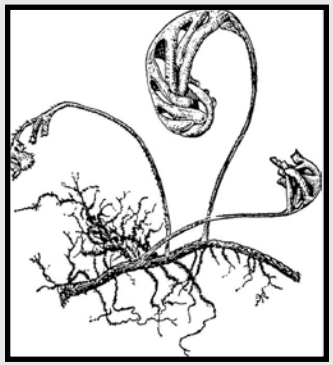
conserve: to keep from being wasted
cycle: a period of time in which a series of events happens

Plants adapt to changes in weather in other ways. For example, a drought is a period of time when very little rain falls and the weather is hot. Some plants are not able to survive during long periods of drought

Other plants, like wild blackberry bushes, have adapted. These plants are strong enough to survive the lack of water.

Survivor Plant: Resurrection Fern

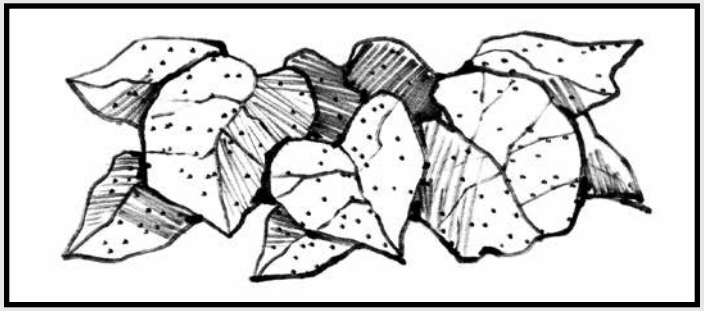
No rain is no problem for the resurrection fern. This plant lives by attaching itself to a large tree. It lives off the nutrients in tree bark and from the air. In dry seasons, the fronds (leaves) of the fern turn brown and shrivel up. The plant looks dead, but it is alive. All it takes is one rain shower for the fronds to uncurl and turn green again.



Many types of plants are moving to survive because Earth is growing warmer. Trees with long life spans are not able to move far over several generations, but plants with short life spans can move more easily. Scientists have found that certain kinds of herbs have moved away from lower **altitudes**, where temperatures have gotten warmer. Each **generation** of herbs grows at a cooler place uphill.

Survivor Plant: Lichen

More than 150 lichens live in Antarctica, the world's coldest place. A lichen is a small plant made of algae and fungus. Lichens survive and reproduce in freezing weather because they have adapted to the cold. They also grow low to the ground for protection from high winds.

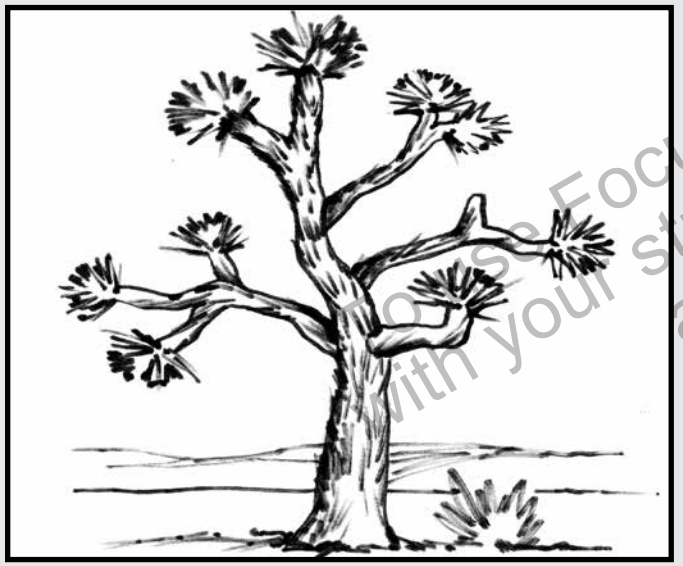


altitude: the height of an object above sea level
generation: the time between the birth of parents and the birth of their offspring

Any plant or animal that is unable to adapt to its environment will die. Adaptation is why there are so many different plants in different parts of the world.

Survivor Plant: Joshua Tree

Desert plants like the Joshua tree have adapted to very high temperatures and little rain. The Joshua tree grows mainly in California.



– Predict –
What might happen if a Joshua tree was planted in the rain forest?

Why Plants Survive

Plants survive for many reasons. They are able to make their own food from the sun's energy. They have special structures—roots; stems, stalks, or trunks; leaves; flowers, fruit, and seeds. These structures give support and help plants make new plants. Plants also survive by adapting to changes in seasons, weather, and environment.

All types of living creatures, including people, depend on plants. You read that the fruits and vegetables people eat are parts of plants. For example, carrot is a root, asparagus is a stem, and lettuce is a leaf.

When plants survive, we survive, too.

– Evaluate –
Imagine that all food crops have died. Why couldn't humans survive just by eating meat?

Glossary

adapting—changing to fit into a new situation

altitude—the height of an object above sea level

conserve—to keep from being wasted

cycle—a period of time in which a series of events happens

diet—what an organism eats and drinks

disperse—to go in different directions

edible—can be eaten

function—what an organ, body part, or structure does

generation—the time between the birth of parents and the birth of their offspring

germinate—to begin to sprout

process—a series of actions that make something happen

reproductive—produces new life

shallow—measuring little from bottom to surface

structure—a part of an organism

sturdy—strong; tough

survive—to remain alive

To Find Out More . . .

Want to learn more about plants?

Try these books

Amazing Plants by Honor Head. Gareth Stevens Publishing, 2007.

A Walk in the Deciduous Forest by Rebecca L. Johnson. Carolrhoda Books, 2001.

Meat-Eating Plants and Other Extreme Plant Life by June Preszler. Capstone Press, 2010.

Plants: Flowering Plants, Ferns, Mosses, and Other Plants by Shar Levine. Crabtree Publishing Company, 2010.

Access these Web sites

Biology4Kids
http://biology4kids.com/files/plants_main.html

neoK12
www.neok12.com/Plants.htm

Plants for Kids
www.kathimitchell.com/plants.html

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Assessments

How Plants Survive

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

How Plants Survive

Check Understanding

Shade the circle next to the correct answer.

1. The plant structure that sucks water and nutrients from the soil is

Ⓐ leaves
Ⓑ flowers
Ⓒ stems
Ⓓ roots

2. The plant structure that takes energy from sunlight to make food for the plant is

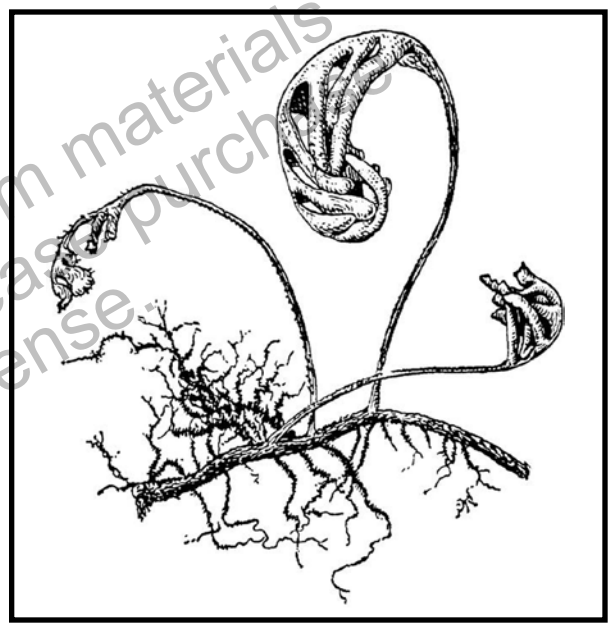
Ⓐ leaves
Ⓑ flowers
Ⓒ stems
Ⓓ roots

3. The plant structure that enables a plant to reproduce is

Ⓐ leaves
Ⓑ flowers
Ⓒ stems
Ⓓ roots

Note that question 4 has only three choices.

4. The picture below shows a resurrection fern.



Why are the fern's fronds (leaves) shriveled up?

Ⓐ The fern is dead.
Ⓑ It is an adaptation that allows the fern to survive.
Ⓒ The fern was burned in a forest fire.

How Plants Survive

Check Understanding

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

5. How do deciduous trees survive during the coldest months?

Ⓐ They conserve energy.

Ⓑ They grow new leaves.

Ⓒ Their leaves turn red, orange, and gold.

Ⓓ They produce flowers.

6. Identify **two** ways that seeds are dispersed.

(1) _____

(2) _____

7. The carrot is an edible plant. Identify the structure of the plant that people eat.

_____

Explain how this structure helps the plant survive.

_____

_____

_____

_____

How Plants Survive

Assessment Scoring Guidelines

1. Answer D is correct.
2. Answer A is correct.
3. Answer B is correct.
4. Answer B is correct.
5. Answer A is correct.
6. Wind, water, or animals
7. The root; The root sucks up nutrients and water from the soil and holds the plant in the ground.

Advanced Level

FOCUS ON SCIENCE

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Plant and Animal Adaptation

English Language Arts Activities

How Plants Survive

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

Use Context Clues

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 *wild* can mean "extreme emotion" and it can mean "in a natural state."

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

Other plants, like wild blackberry bushes found in New York, have adapted.

In this sentence, *wild* means "in a natural state." 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.

leaves A. goes away
B. plant structures that collect sunlight

1. Evergreen trees do not lose their ____.

TRY THE SKILL

space A. room B. the solar system

2. All creatures need ____ in which to live.

root A. underground plant structure B. dig

3. Pigs like to ____ for scraps of food.

produce A. fruits and vegetables B. make

4. Some plants ____ flowers.

trunk A. a car's storage area
B. plant structure that provides support

5. The ____ of a maple tree is covered in bark.

Prefixes

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. An introduction to something more important

Ⓐ reverse
Ⓑ unknown
Ⓒ prelude
Ⓓ reconsider

TRY THE SKILL

2. Go back in the direction from which you came

Ⓐ reverse
Ⓑ unknown
Ⓒ prelude
Ⓓ reconsider

3. Something you haven't learned

Ⓐ reverse
Ⓑ unknown
Ⓒ prelude
Ⓓ reconsider

4. Think about something again

Ⓐ reverse
Ⓑ unknown
Ⓒ prelude
Ⓓ reconsider

Predict Outcomes

You can use the facts you read to make predictions. Try to predict what will happen in your reading and then see if you were correct. If your predictions were not what you thought, perhaps you need to re-read those paragraphs. Maybe you didn't understand them well.

In this book you read about how plants adapt to stay alive. Let's say that a deciduous tree in upstate New York has large, broad leaves so it can take in a lot of sunlight during spring and summer.

Predict what will happen to these leaves in winter.

A lot of snow falls on the leaves in winter. The leaves become heavy with snow and can't take in all the water.

Predict how this tree might adapt for the winter.

The tree drops its leaves in the fall and grows new ones in spring.

TRY THE SKILL

Read about each plant. Then shade in the letter next to the statement that correctly predicts what will happen.

1. Desert plants called succulents store water in their stems or leaves. Desert animals need to drink water. Predict what will happen if a succulent is covered with sharp spines.

Ⓐ Animals will chew on the plant to get the water.

Ⓑ Animals will remove the spines.

Ⓒ Animals will stay away from the plant.

2. In a temperate rain forest, winters are not very cold. Summers are not very hot. A lot of rain falls, more than 150 inches per year. Predict how trees grow in this kind of forest.

Ⓐ Trees grow very tall and live a long time.

Ⓑ Trees are small and are easily knocked over by high winds.

Ⓒ Trees are few because not many kinds of trees can survive in this type of environment.

Use an Index

To find information in a book, you don't have to read the whole thing. Instead, you can check the index. An index is found at the back of a book. It lists the topics in alphabetical order, along with their page numbers. For example, here is part of an index of a book about plants.

Index

TRY THE SKILL

Study the index. Then answer the questions below.

1. Which pages would probably have information about the beginnings of a plant?

_____

2. Which pages would probably have information about trees losing their leaves?

_____

3. Which page would probably have information about scientists who study plants?

_____

4. Which page would probably have information about how animals interact with plants?

_____

Answer Key

Use Context Clues

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

Prefixes

1. C
2. A
3. B
4. D

Predict Outcomes

1. C
2. A

Use an Index

1. Pages 7–9, 24, 34–37
2. Pages 10, 12–14
3. Page 12
4. Page 19