New York

5

Science Companion

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To the Student

Welcome to **Science Companion,** Grade 5. This book provides review and practice on key skills and concepts in science. In addition, the lessons in this book will help you study the skills that are important to mastering your state test in science.
Here's how to use this book:

- Before you begin the first lesson, take the Tryout Test. This test will show you your strengths and weaknesses in the skills you will need to understand for your state test. Then you can use this book to focus on studying the types of questions that were hard for you to answer.
- Work through the units that follow the Tryout Test. The lessons in each unit provide instruction, example items, and unit tests based on the key skills. Take each unit test to see if you have mastered the skills from the unit.
- After completing all the lessons, take the Progress Test. Your score on this test will show your understanding of the key skills and concepts in science.
- Finally, take the Mastery Test, which will give you additional questions and assess the key skills you have mastered.

We hope you will enjoy using this book and that you will have a fun and rewarding year!

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LESSON 8
Living Structure and Function

Review the Expectations
(4-LS1-1, 4-LS1-2, 4-PS4-2)

- Plant and animal structures help organisms stay alive
- Animals have structures that process information
- Light enters the eye to allow objects to be seen

Q: How is a rhinoceros horn like your fingernail?

A: Both are **external structures**. Both grow from the same hair-like material. Both help their owner survive. Humans can use their fingernails as tools. Rhinos use their horns to defend themselves and find food.

Q: Do plants and animals have **internal structures** that help them survive?

A: Yes. For example, plants have tube-like structures to carry food and water. Animals have organs such as the stomach, the heart, and the lungs.

Q: How do animals use their senses to survive?

A: Animals have structures that receive information from the outside. This gets sent to the brain. The brain processes the information. Then it tells the body what to do.

Bright Ideas!

Work with your partners to fill in the table. For the third row, choose your own organism. You can even make one up! Just be sure the structure would help the organism survive on Earth.

Organism	Structure	Function
Oak tree		Starts new trees
	Lung	

Get Started

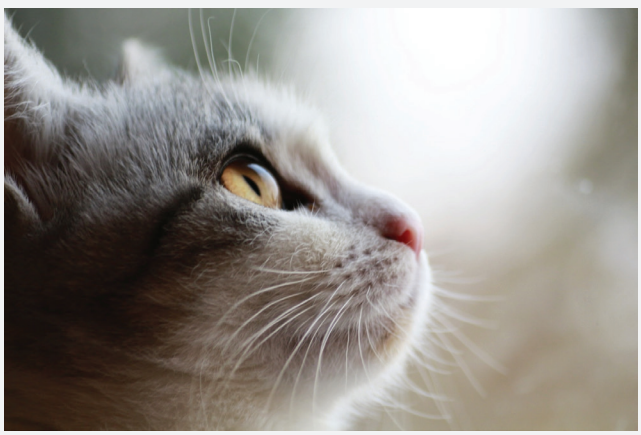
Directions: Read the following article. Then do a second read. During this read, put a question mark (?) next to anything you are curious about.

Internal and External Structures

Plants and animals have structures that help them to survive. These can be internal or external structures. The seeds inside an apple and the bones of your body are internal structures. A cactus's spines and your fingernails are external structures.

Whether the structure is external or internal, it usually helps the organism survive somehow. Some structures help the organism grow. A plant's leaves, for example, gather light and turn it into energy. Your stomach turns food into energy for growth and movement.

Most structures work together in a **system**. Think about a cat's whiskers. You might think they are there to make the cat look cute. But really, they work with the cat's eyes and brains in a system. The whiskers can feel changes in air flow. The cat's brain combines this with information from the eyes. The result? Cats are superb hunters.



All living things have the same basic needs. For example, they all must eat, drink water, and grow. Even though body structures might look different, they do similar jobs.

Key Concept: How does the seed inside an apple help apple trees survive? How does the spine help a cactus survive?

Key Concept: How do the leaves of a plant help it to survive?

For example, living things all need to exchange gas with their environments. A fish's gills pull in oxygen from the water. And the lungs of a mammal like you get oxygen from the air. In fact, a plant's leaves also do the job of gas exchange! Plants need carbon dioxide to survive. They can pull in this gas through tiny holes in their leaves. These structures are different from each other, but they have the same basic function.

Sensing Information

Sensory organs allow animals to understand what is around them. They combine internal and external structures. **Sound** is an energy that moves through a material, such as the air. Many animals have structures that let them hear sound. Mammals, birds, and other animals have ears. Some animals have structures that are not ears that allow them to hear. For example, grasshoppers have a hearing structure underneath their wings. **Hearing** sound helps an animal find food, avoid danger, and communicate with others.

Smell is important for survival. When we smell something rotten, we know right away to avoid it. It may have diseases that could harm us. Smell also lets us find good things. Think about entering a building and smelling pizza. What is actually happening? The warm pizza releases molecules into the air. These molecules drift into our nose. The nose sends information to our brains: "Something good to eat is close by!"

Our sense of **taste** is closely related to our sense of smell. They both sense substances from the environment and send signals to our brain about them. And if your nose is clogged up, you won't taste things as well.

Systems: Think of another plant or animal, any one you choose. What are some other structures that work together in that organism?

Key Concept: How does the sense of smell in an animal work?

Get Started

An animal's sense of **touch** helps it survive too. Touch helps us avoid things that are too hot or cold. It lets us feel changes in pressure too. Harbor seals use their whiskers to feel their way through the water. These whiskers are so sensitive, they can feel the trail of a fish moving 100 meters away! With this sensitive touch, harbor seals can hunt even when they cannot see in dark waters.

Cause and Effect: The Venus flytrap is a plant that eats small animals. It has a "mouth" structure with hairs inside. When an insect brushes against a hair, the trap snaps shut. What sense does the flytrap use to catch the prey?

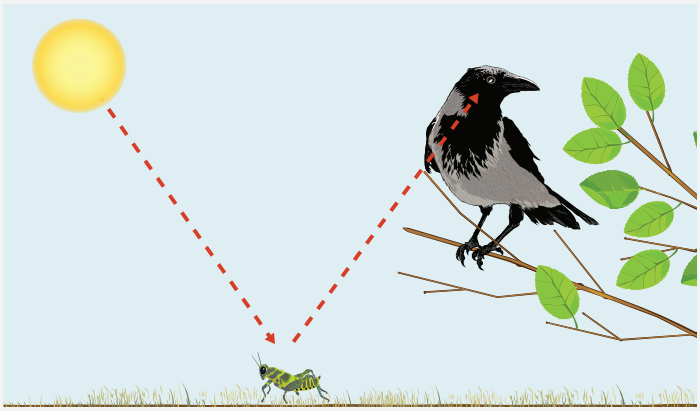
_____

Information from Light

Sight is the ability of an animal to detect light. Animals have developed many different kinds of eyes. Some animals cannot see colors but can tell dark from light. Some animals can see many colors, even ones that we cannot see.

Why is seeing light helpful for animals to survive? One reason is that light gives information about where to find food. Plants need light to make their own food. So, where light exists, plants can usually be found. And plants mean food. So animals that sense light well have an advantage.

Let's look at how animals use light to get information. The Sun is the main source of light in the natural world. The light it gives off travels for millions of kilometers before it reaches Earth. On Earth, light bounces off objects and continues to travel. Some of that light enters an animal's eye. Look at the following diagram:



Light that bounces off the grasshopper enters the crow's eyes. The crow's brain gathers information from this light. For example, the crow has learned that this type of grasshopper is not poisonous. In fact, it will make a great snack!

Directions: Use this photograph of a chameleon capturing a dragonfly to answer Questions 1–3.

1. What is a feature that would best help the dragonfly avoid capture?

A a bigger body
B a longer body
C a body covered with bright scales
D a body that blends in with the background

2. Chameleons have large, powerful eyes that help them hunt. Light travels to give the chameleon information about its prey. Draw arrows between each box to show where light starts and where it ends up.

Dragonfly	Sun
Chameleon's brain	Chameleon's eye

Think About It

1. Imagine how each feature would change the situation.

- A dragonfly with a bigger or longer body would have a harder time getting away from the chameleon. Choices A and B are incorrect.
- Bright scales would make it easier for the chameleon to spot the insect. Choice C is incorrect.
- If the dragonfly could blend in with the background, it might avoid being seen at all. **Choice D** is correct.

Developing Models

2. To develop a good model, think about the order of events. Where does most natural light on the Earth begin? Light travels in a straight line, and it bounces off objects. Animal's eyes send information about light into the brain.

Get Started

Write it Out

3. Describe one other feature of the chameleon that helps it to survive. Use only evidence from the photograph.

Arguing from Evidence

3. You already thought about how the chameleon's eyes catch light to help it hunt. That is just the start! There are a few amazing things the chameleon is doing. Look closely at the photograph. Pick one feature and think how it helps the chameleon.

How does this feature help the chameleon survive?

On Your Own

Directions: Complete each of the following items.

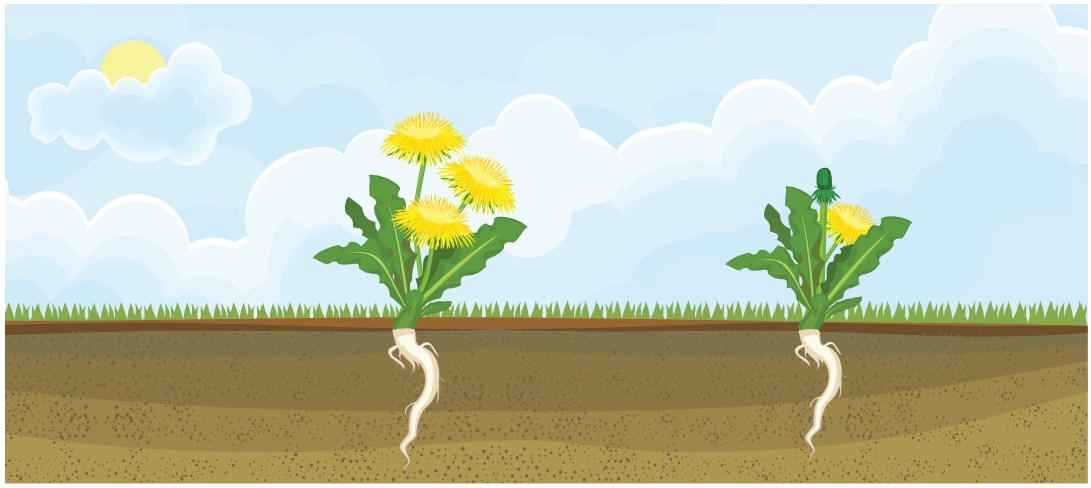
1. One afternoon, a rabbit sees a fox and runs away behind a bush. How does the rabbit's brain use light to process information? Circle one word or phrase from each box to correctly complete the sentences.

The [fox | Sun | rabbit] sends out light rays. The light rays bounce off the [fox | bush | rabbit.] They enter the [fox's | rabbit's] eyes and give its brain information.

2. The leaves of Gina's plant always face the Sun. Gina says this is because the leaves are happier when they are looking at the Sun. Which of these is a better explanation?

A Leaves receive more oxygen if they face the Sun.
B Plants that face the Sun have deeper roots.
C Plants absorb more water when they face the Sun.
D Leaves that face the Sun receive more of the Sun's rays.

3. Which structure in dandelions and grass absorbs water from the soil?



A leaves
B roots
C stems
D flowers

On Your Own

Explore and Learn

4. What is the function of the gills of a fish and the lungs of a bear?

How do plants do this same job?

5. The following chart describes the sense organs of an animal. It gives the sense each organ detects. And it gives an example of how that sense could help an animal survive. Fill in the remaining four blanks to complete the chart.

Sense Organ	Sense	Examples of How It Helps Animal
Eye	Sight	Color patterns on edible fruit
	Hearing	Call of predator species
Mouth		Bad taste warns of poison
Nose	Smell	
Skin	Touch	