



Essential Question

What ideas can we get from nature?



Go Digital!



IDEAS FROM NATURE

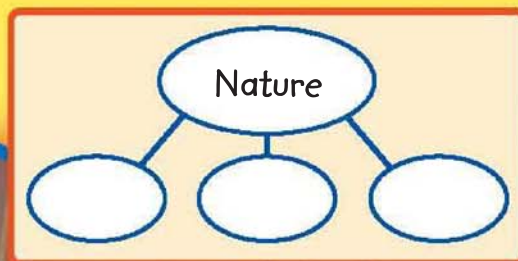
This spider may be small, but it inspires big ideas. Its webs are super strong, and scientists want to know why.

- ▶ Scientists look to nature for new ideas.
- ▶ These ideas help people in many different ways.

Talk About It



Talk with a partner about how nature inspires new ideas. Write words you have learned.



Vocabulary

Use the picture and the sentence to talk with a partner about each word.



effective

The broom is an **effective** tool for sweeping up leaves and dirt.

What is an effective tool for cutting paper?



example

The apple is a good **example** of a healthy fruit.

Name an example of a healthy vegetable.



identical

Mark and Matt are **identical** twins because they look alike.

What makes two things identical?



imitate

This robot can **imitate** the way Cody moves.

What does it mean to imitate something?



material

The baby's blanket is made of a soft, warm **material**.

Describe the material your shirt is made of.



model

Kevin and I play with my **model** airplane in the park.

Why does it help to have a model?



observed

Meg and Joann **observed** the fish, and wrote down what they saw.

What is another word for *observed*?



similar

My dad and I like to look alike, so we wear **similar** shirts.

What is a word that means the opposite of *similar*?

Your Turn

COLLABORATE



Pick three words. Then write three questions for your partner to answer.

Go Digital! Use the online visual glossary

BATS DID IT FIRST


Joel Sartore/National Geographic/Getty Images



Essential Question

What ideas can we get from nature?

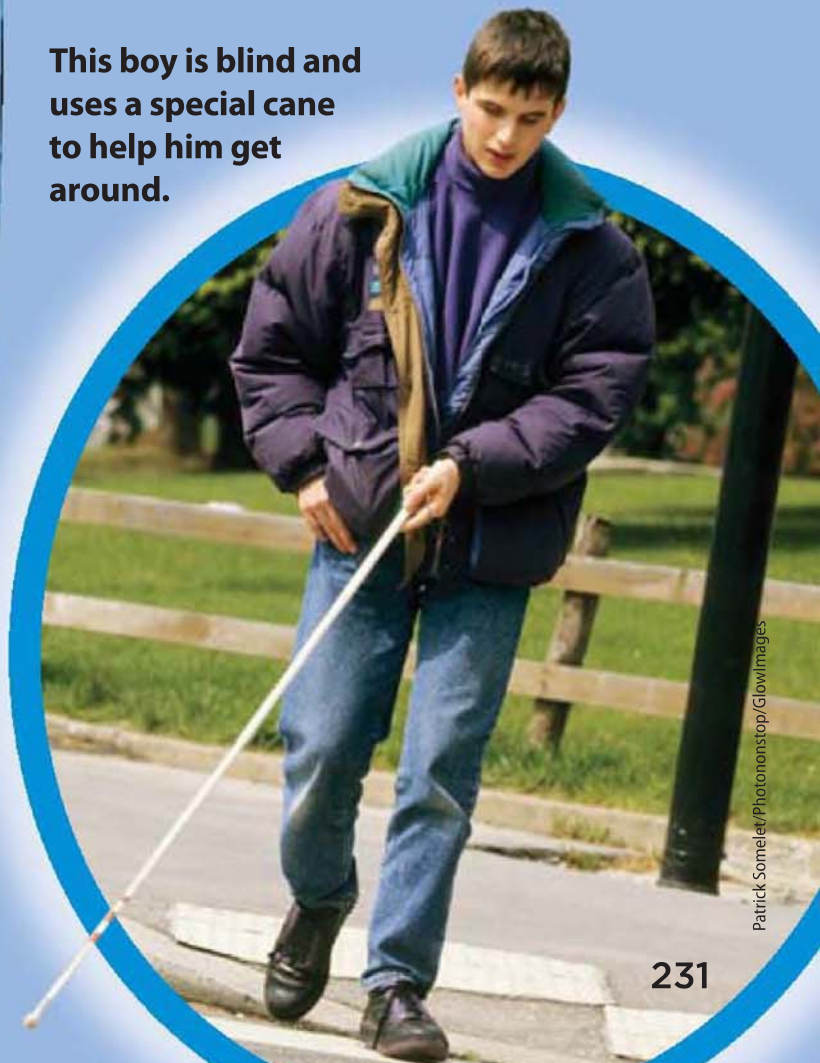
Read about how bats inspired a new cane for blind people.



Nature is full of great ideas. Many inventors and scientists just step outside and look around for inspiration and ideas. They often **imitate**, or copy, what they see outdoors. They use nature to inspire their inventions.

One amazing invention was inspired by bats. It's a special cane that helps blind people navigate and get around.

This boy is blind and uses a special cane to help him get around.





Canes Lead the Way

Many blind people use canes. They tap the canes on the ground in front of them to locate objects that may be in the way. This helps them move around safely as they do their shopping or walk outdoors.

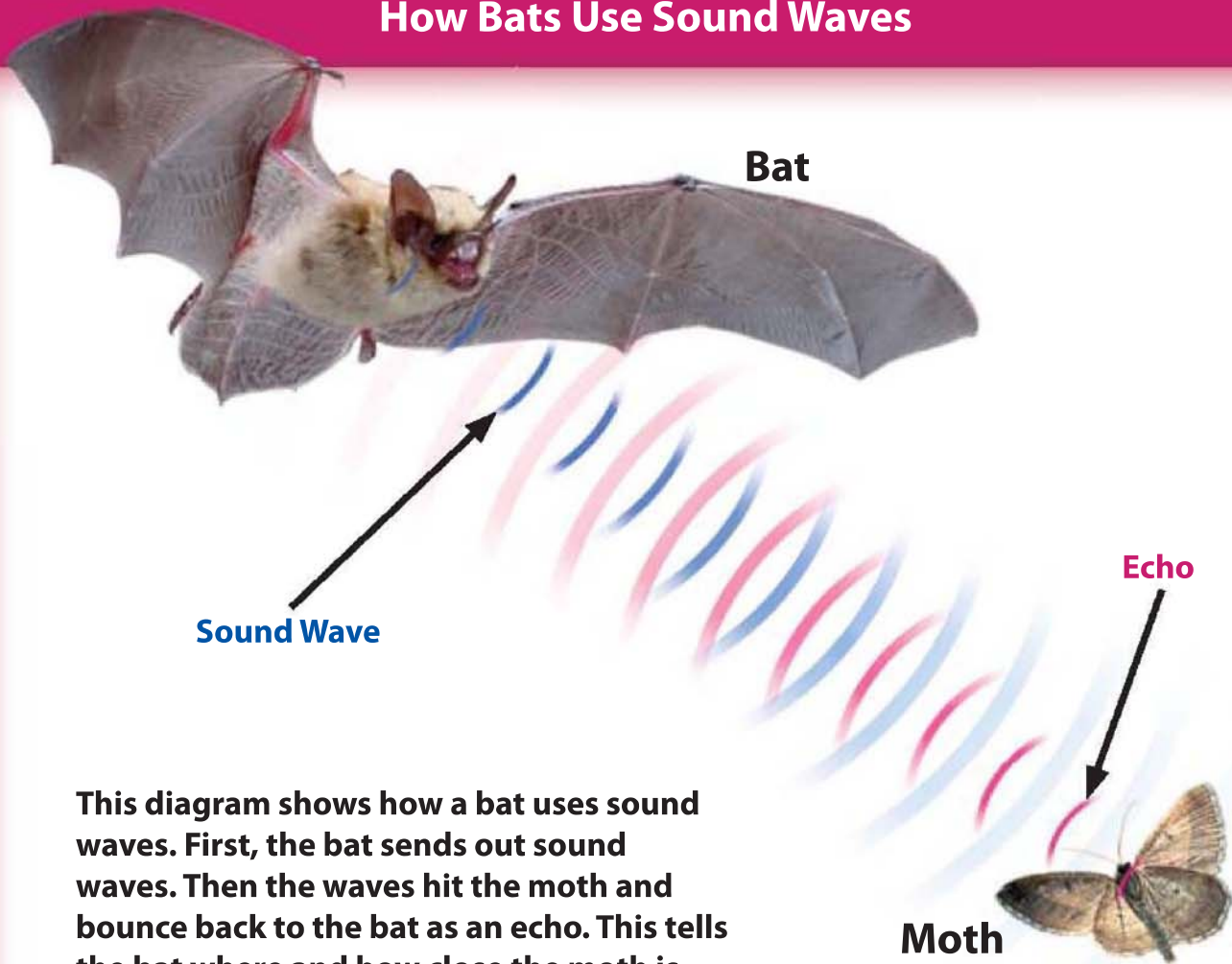
The bat-inspired cane is different from these canes. It sends out sound waves, or signals. These signals are almost **identical** to the ones bats use to find their way in the dark.

How Bats Get Around

The scientist that came up with the idea for the new cane was inspired by watching bats. He **observed** the way bats fly at night. The bats make high-pitched sounds that people cannot hear. These sounds create an amazing navigation system for the bats. Here's how it works.

Bats send sound waves out through their mouth or nose. These sound waves hit objects and then bounce back as an echo. The echo tells the bats how far away an object is and how big it is. This information helps bats find bugs to eat. It is also an **effective** way to keep bats from bumping into trees and other bats.

How Bats Use Sound Waves



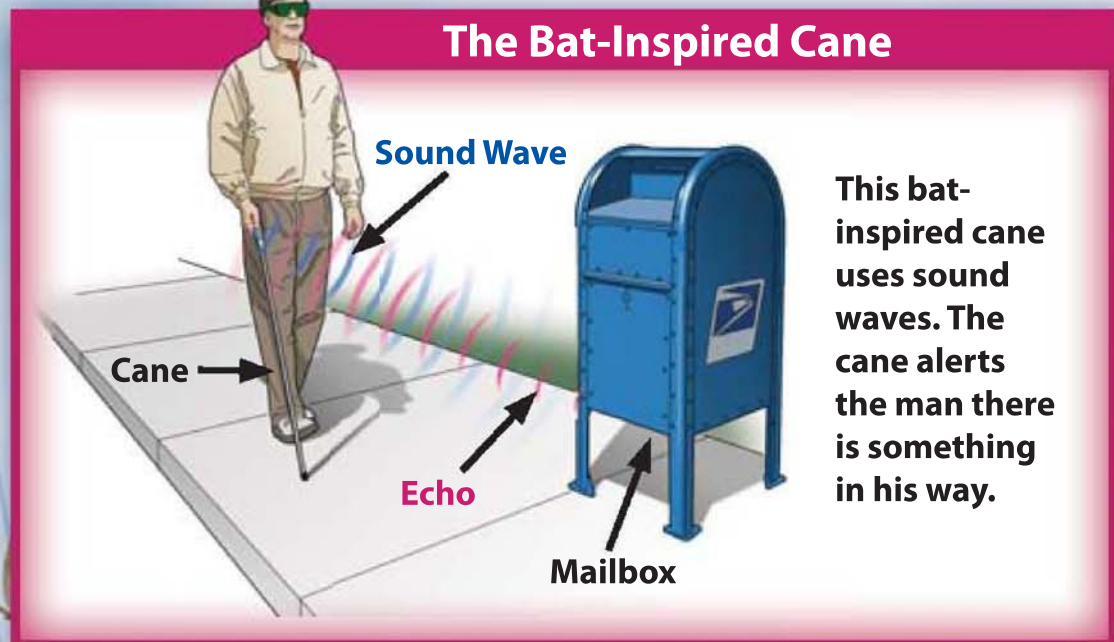
This diagram shows how a bat uses sound waves. First, the bat sends out sound waves. Then the waves hit the moth and bounce back to the bat as an echo. This tells the bat where and how close the moth is.


A Batty Idea

The scientist who invented the new cane took what he learned from observing bats. He used a **similar** idea. He started with an ordinary white cane. He wanted the cane to imitate the way bats use sound waves. So, he sketched plans and made a **model** of his invention. When he built the cane, the scientist used a special **material** that was lightweight and strong. Then he added sound waves. Finally, a team of scientists tested the cane. It worked!

How The Cane Works

The handle of the cane sends out signals. The signals bounce off objects in front of the cane. Then an echo bounces back to the cane's handle. The person holding it feels buttons on the handle vibrate, or shake. These buttons tell the person how far away and how big the object is.






Scientists and inventors study plants and animals all the time. Their observations have led them to invent many useful things. And like many new inventions, the bat-inspired cane is a good **example** of how great ideas can come from nature.

This scientist is studying how bats fly.

Make Connections

 How did bats inspire a cane that helps blind people? **ESSENTIAL QUESTION**

What is something in nature that inspires you? What would you invent? **TEXT TO SELF**