INSTITUTE OF
READING
DEVELOPMENT

Nonfiction

Program 5

LS version

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Food You Can Use

Did you know that some food isn't just for eating? Many snacks have hidden powers. We can use them in some surprising ways.

Oatmeal is a breakfast food that can heal itchy skin problems. Oats contain a chemical that helps reduce swelling. If you rub oatmeal paste on a rash or a bug bite, your skin will feel better in no time. Plus, oatmeal contains vitamin E, which hydrates your skin. It traps moisture to keep your skin healthy.

Banana peels aren't good for eating, but they are very useful for polishing things. Banana peels contain potassium. That's one of the main ingredients in shoe polish. Next time your favorite leather sneakers get dirty, try rubbing them with a banana peel. The stain will come right off. You can use banana peels to polish other things too, like jewelry, or even your teeth!

Pickle juice has a use that might surprise you. It's great at melting ice. Pickle juice contains a lot of salt, which melts snow and ice quickly. Some cities even use it to clear snowy roads after a storm. You can use it at your house, too. Spray it on your parent's icy car windows. It will melt the ice right off. But don't forget to eat the pickles first!

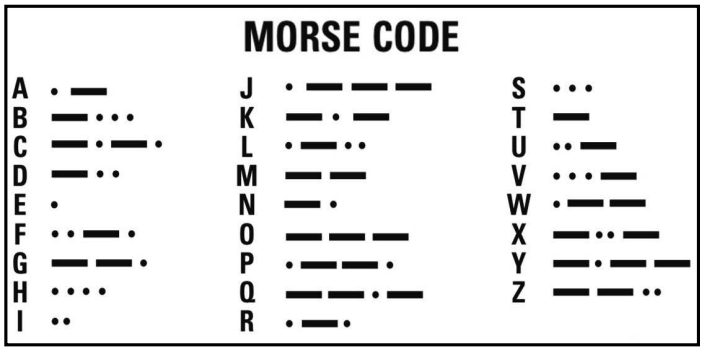
Lesson 2

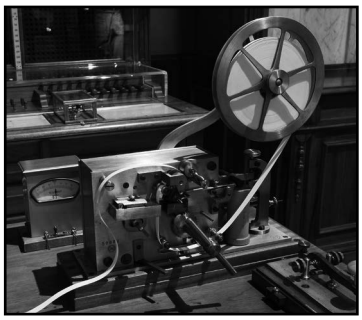
Cracking the Code

Have you ever wished you could write secret messages? Coded languages have existed since ancient times. People have used them throughout history to communicate quickly, to keep information secret, or just to have fun.

Morse Code

Morse code is used to send messages by a machine called a **telegraph**. In Morse code, every letter is a set of dots or dashes. A telegraph operator taps the message on the machine. For example, find the letter 's' on the chart. To type 's', you would tap three short clicks, one for each dot. For 'a', it would be one short click for the dot, then a long click for the dash.





Morse telegraph machine

Morse code and the telegraph were both invented by Samuel Morse in 1836. Morse's inventions changed the way people communicated. Before this, messages had to be sent by train or boat. It took a long time. The telegraph made it possible to send messages instantly. The telegraph isn't used much anymore. Today we use computers and phones to communicate even faster.

Navajo Code Talkers

In WWII, hundreds of Navajo men joined the U. S. Marines. They served as **code talkers**. They helped create a secret code based on their language. Their job was to send coded messages over the radio. A code talker on the other end would translate it. This was a fast way to get information to Marine officers without the Japanese knowing.

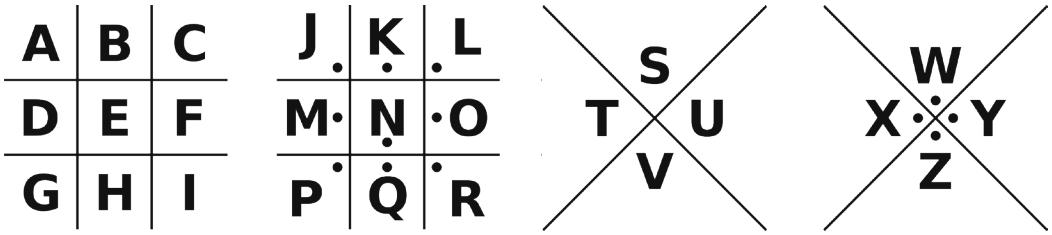
Code Talkers in WWII

The Navajo code was the perfect way to communicate in secret. Navajo is a very difficult language. Very few people spoke it. Plus, the same word can mean different things, depending on how it's pronounced. It was very unlikely the Japanese would ever figure it out. And they never did!

Make Your Own Code!

Want to try your own secret code? The reverse alphabet is a simple way to code messages. In this code, 'z' stands for 'a', 'y' stands for 'b', and so on. For example, 'hello' in reverse alphabet is 'svool'. If anyone tries to read your secret notes, they'll be very confused!

The Pigpen cipher is a code that uses symbols instead of letters to write messages. Look at the chart below. Every letter of the alphabet is inside its own special shape. Some shapes have straight edges and some are diagonal. Some have dots and others don't. To write a message, draw the shape each letter is in, but leave the letter out. For example, the word 'secret' is written at the bottom of the chart using the Pigpen cipher. Use the chart to try writing your own name!



Use the Pigpen cipher to write your name:_____

Code talkers: USMC Archives from Quantico, USA, CC BY 2.0, via Wikimedia Commons

Lesson 3

The Mystery of Stonehenge

Stonehenge is one of the most fascinating ancient structures in the world. It's a huge stone monument in the English countryside. Historians know it was built around 5,000 years ago. But how it was built? And what was it used for? Those answers are still a mystery.

Stonehenge is an enormous group of massive, upright stones. Each one is over 13 feet high and weighs 25 tons. That's as heavy as a fire truck. The stones are arranged in a big outer circle with a smaller circle inside. Some of the original stones are missing, but you can still see many of them today. When you stand next to Stonehenge, you can really imagine yourself in prehistoric times!

Stonehenge today

No one knows exactly how Stonehenge was built. An ancient legend says it was built by giants, but that's unlikely! Historians know some of the stones came from the country of Wales. It's 150 miles away. How did prehistoric people move such heavy stones so far? One theory is that they dragged them on big wooden slabs. However they did it, it would have been back-breaking work.

What was Stonehenge used for? That's another mystery. Some historians believe ancient people used it like a calendar. It helped them celebrate the seasons. The largest stone at Stonehenge is called the Heel Stone. On the longest day of the year, the sun rises directly over the Heel Stone. Every year, thousands of people still gather at Stonehenge to watch the sun rise on the summer solstice.

Paragraph 1:

You probably eat sugar every day, but what do you know about it? Sugar is the most common sweetener in the world. Most of it comes from a plant called sugarcane. It's a thick grass that grows in hot climates. Sugar wasn't always easy to get. In the 1700s, it was so valuable that people would lock it up in a special 'sugar safe'!

Paragraph 2:

Making sugar from sugarcane plants involves many steps. First, sugarcane stalks are harvested from the fields. This takes a lot of work. Next, the stalks are pressed through huge rollers to remove the sugary sap. The sap is collected in big tanks. Then, the sap is boiled until water evaporates and sugar crystals form. This process is repeated until all the water is gone. Finally, the sugar crystals are dried with hot air. Now the sugar is ready to eat!

Paragraph 3:

Sugar and honey have a lot in common, but there is one big difference. Both have been used as sweeteners for thousands of years. Both substances also come from plants. Sugar comes from sugarcane. Honey starts out as nectar from flowers before bees turn it into honey. But honey can also kill germs! If you rub honey on a cut, it won't get infected. You can't do that with sugar.

LESSON 4

Animal Life Cycles

GET READY

Look at the picture of the mother loon and her baby on these pages. How are their bodies similar? How are they different? In this chapter, you'll find out about the changes animals' bodies go through as they grow from baby to adult.

VOCABULARY

EXPLORATION ACTIVITY

How do caterpillars change as they grow?

PURPOSE

Observe the changes a caterpillar goes through over the course of its life.

PROCEDURE

- Your teacher will give you a caterpillar and a container to keep it in.
- Prepare the container by placing food, water, and some leaves and branches inside.
- Then, gently put your caterpillar in its new home.

OBSERVE

Every day, look carefully at your caterpillar. Make a chart to record any changes in its body.

ANALYSIS

- How did your caterpillar's body change over time? If it took different forms, describe each form.
- Do other animals have different stages of development? How could you find out?

MAIN IDEA

All animals grow and change over time.

What are the stages of an animal's life?

All animals grow and change over time. The series of changes an animal goes through from birth to death is called its **life cycle**. All animal life cycles follow the same pattern. Animals are born, they grow and reproduce, and they die.

The length of time an animal is alive is called its **life span**. Life span varies widely from animal to animal. The mayfly has a life span of one day, but a bowhead whale can live over 100 years! Scientists aren't sure why the life spans of some animals are longer than others.

CHECK YOUR UNDERSTANDING

What is the difference between a life span and a life cycle?

What is metamorphosis?

Most young animals look like smaller versions of their parents. Puppies look like small dogs. Lambs look like small sheep. However, some animals, like young insects, look different from their parents.

Insects such as butterflies and crickets go through **metamorphosis** (met.uh.MOR.fuh.sis). During metamorphosis, the insect's body goes through several stages as it moves from birth to adulthood. Each stage looks very different from the previous one.

STAGES OF LIFE
Robins are born from eggs, and go through several stages over the course of their lives.

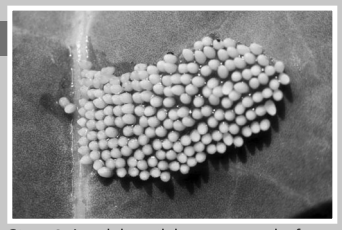
Complete Metamorphosis

During **complete metamorphosis**, an insect's body changes completely in four stages. The insect's body is totally different in each stage.

Take, for example, a luna moth. It begins as an egg laid by its mother on a leaf. The next stage starts when a tiny caterpillar hatches from the egg. This caterpillar is called a **larva** and it grows quickly. It can eat its own body weight in leaves every day!

After a few weeks, the caterpillar moves on to the third stage. It attaches to a sturdy stem or branch and forms a protective shell called a **pupa**. Inside the pupa, the caterpillar begins to grow into an adult moth.

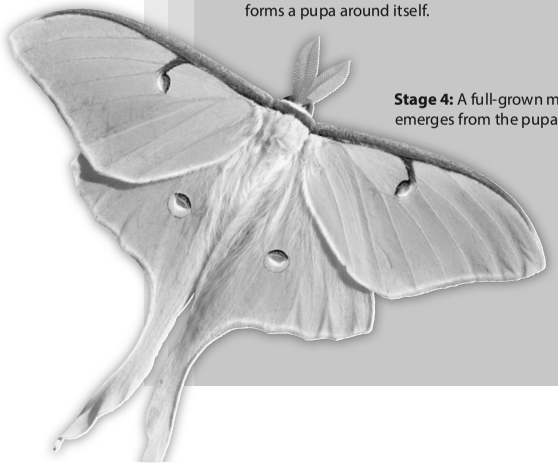
In a month or two, the caterpillar enters the fourth and final stage. It breaks out of the pupa as a full-grown luna moth. The moth waits several hours for its wings to harden. Then it flies away. The whole process begins again when that moth lays the eggs that will become the next generation of moths.



Stage 1: An adult moth lays eggs on a leaf.

Stage 2: Fast-growing larva

Stage 3: The larva attaches to a branch and forms a pupa around itself.

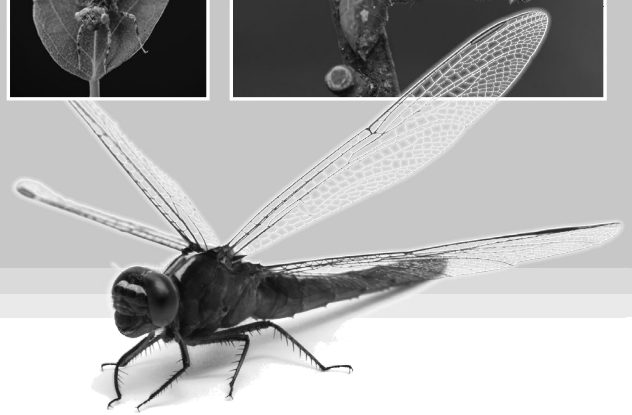


Stage 4: A full-grown moth emerges from the pupa.

Stage 1: An adult dragonfly lays eggs on a plant or in the water.

Stage 2: Nymphs hatch from the eggs and go through several molts.

Stage 3: The fully grown nymph leaves the water and molts one last time.



Unlike the nymph, the adult dragonfly has wings and lives in the air.

Incomplete Metamorphosis

During **incomplete metamorphosis**, the insect's body also goes through multiple stages. However, they are not as distinct from each other.

Dragonflies go through incomplete metamorphosis. The three-stage process begins when an adult dragonfly lays eggs on a plant in the water.

In the second stage, a **nymph** (NIMF) hatches from the egg. The nymph looks like a tiny version of the adult dragonfly, except it has no wings. However, it does have gills that allow it to breathe underwater. This stage can last for several years as the nymph grows bigger and breaks out of its outer skin, or **exoskeleton**, many times. This process is called **molting**.

Once the nymph is fully grown, the final stage begins. It grows lungs and leaves the water. Then it molts one more time to become an adult dragonfly. In this final molt, the nymph grows wings. The adult dragonfly lives in the air instead of in the water.

CHECK YOUR UNDERSTANDING

How is incomplete metamorphosis different from complete metamorphosis?

Why do insects go through metamorphosis?

Scientists have many theories about why insects go through metamorphosis. Different body forms can help an insect deal with harsh weather. For example, some butterflies remain in their pupae throughout cold winters. They emerge in the spring once the weather is warmer and there is more food available.

Also, insects use different resources during each stage of their lives. For example, a dragonfly nymph lives in the water, so it eats different food than the adult dragonfly, which lives in the air. That means young and mature insects are not competing for food or places to live, so everyone is more likely to survive.

CHECK YOUR UNDERSTANDING

What is one reason insects might go through metamorphosis?

LESSON REVIEW

1. **VOCABULARY** Match each word to its meaning.

LIFE CYCLE	The process of an insect growing bigger and breaking out of its outer skin
LIFE SPAN	Series of changes an animal goes through from birth to death
MOLTING	The stages an insect goes through on its way to adulthood
METAMORPHOSIS	The length of time an animal is alive

2. **MAIN IDEA** What are the stages of an animal's life cycle?
3. **CRITICAL THINKING** The average life span of an emperor penguin is 20 years. Why don't all emperor penguins live for 20 years?
4. **COMPARE AND CONTRAST** What is the difference between complete and incomplete metamorphosis?
5. **SEQUENCE** What are the stages in the complete metamorphosis of a moth?