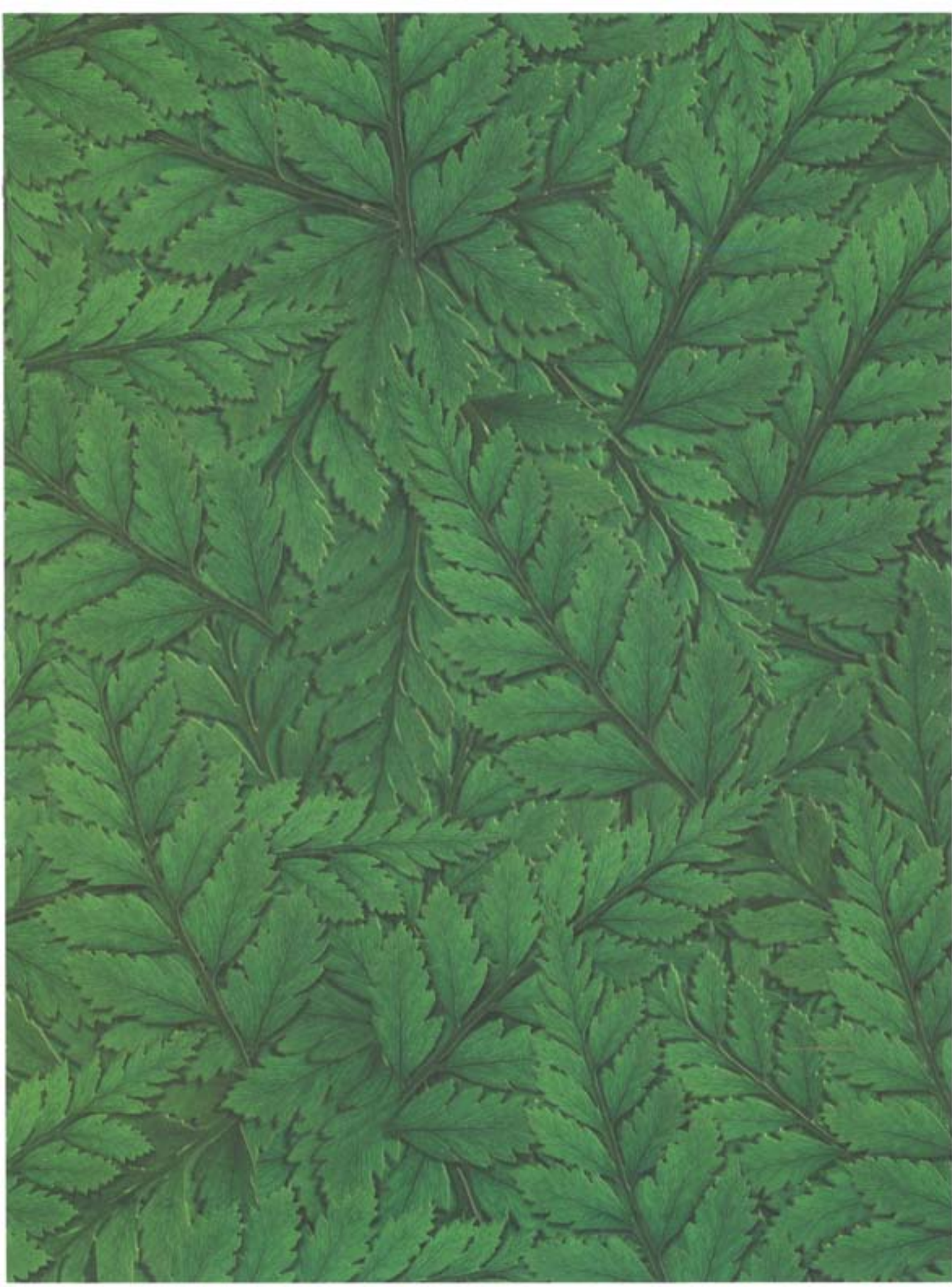




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# Science



**Jackson's Chameleon**





MACMILLAN  
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# Science

Lucy H. Daniel  
Jay Hackett  
Richard H. Moyer  
JoAnne Vasquez

#### About the Cover

Chameleons are known as the masters of camouflage. They have the ability to change their skin color and patterns. Chameleons are slow-moving animals so they rely on protective coloration for defense. For protection, a chameleon might show bright colors, which often means "bad-tasting" or "poison" to predators. If this doesn't work, they may shift to a dull color and play dead.

**INQUIRY** What else would you like to know about chameleons? Write your own question or questions to answer.



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# Letter from Sally Ride



When I put on my helmet and climbed into the space shuttle I knew I was in for the adventure of a lifetime. That trip into space was a dream come true. The dream began when I was in elementary school. And studying science made it possible! I've always been interested in science. In the fifth grade, I made a mobile of the planets for a class project. Even then I wondered what it would be like to explore Mars.

Neither of my parents were scientists, but that didn't matter. They encouraged me to read books and to explore the things that interested me. And they encouraged me to be curious, to ask questions, and to think about things for myself. All of these things helped me become a scientist and an astronaut.

Maybe some of you have dreams like mine. Maybe you dream of exploring Mars one day. Whatever you dream of doing, it will help you to have the skills of a scientist—ask questions and explore things for yourself! And always

Reach for the stars!

*Sally K. Ride*



# Be a Scientist!

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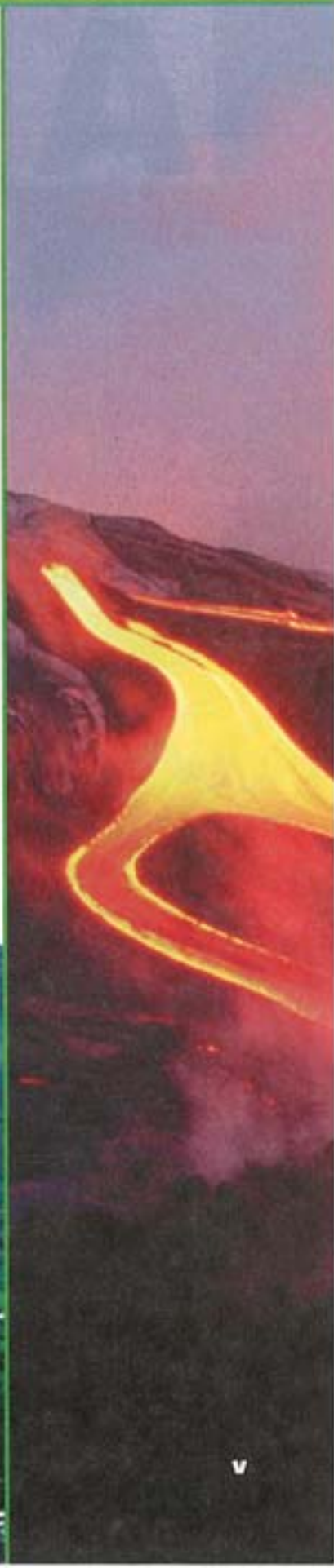
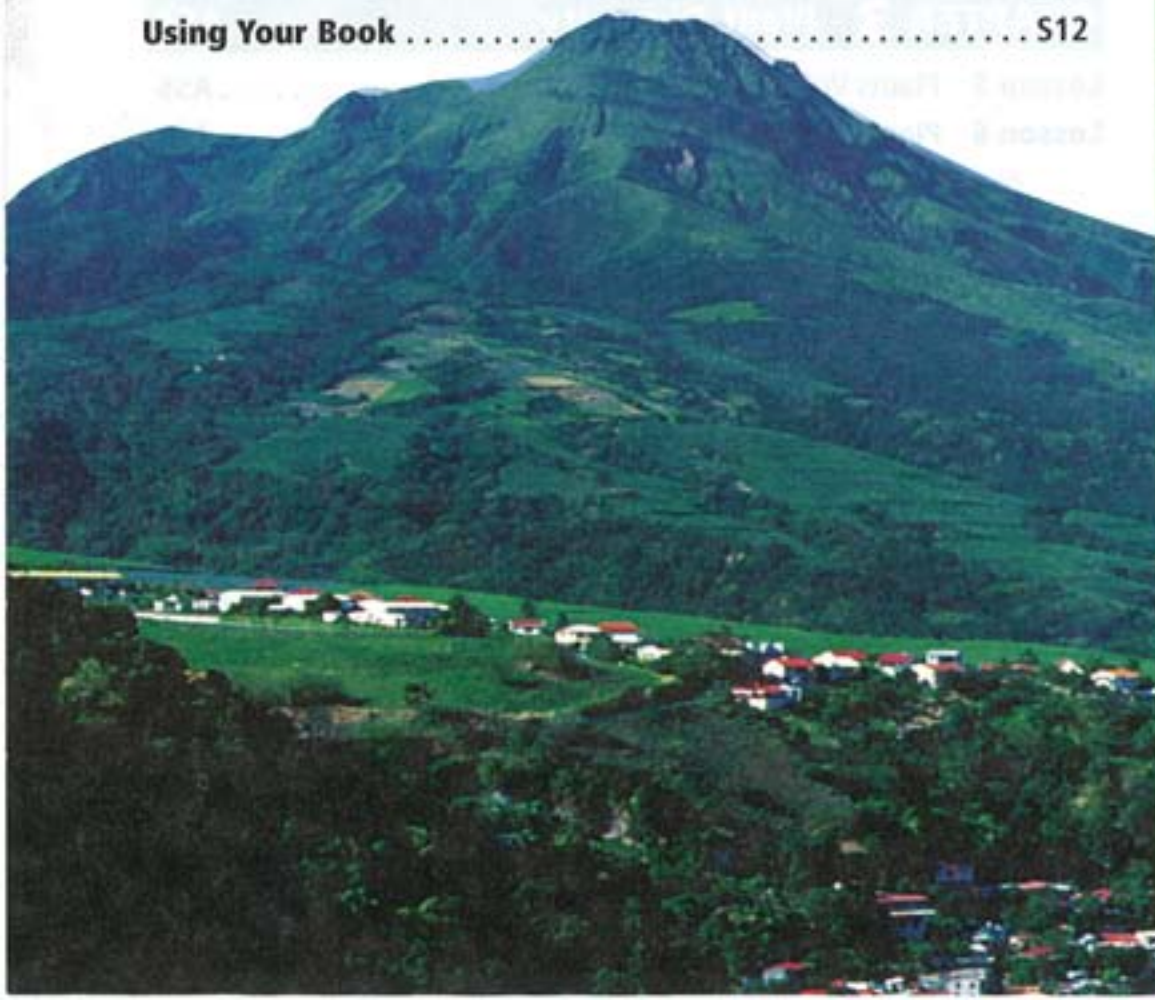
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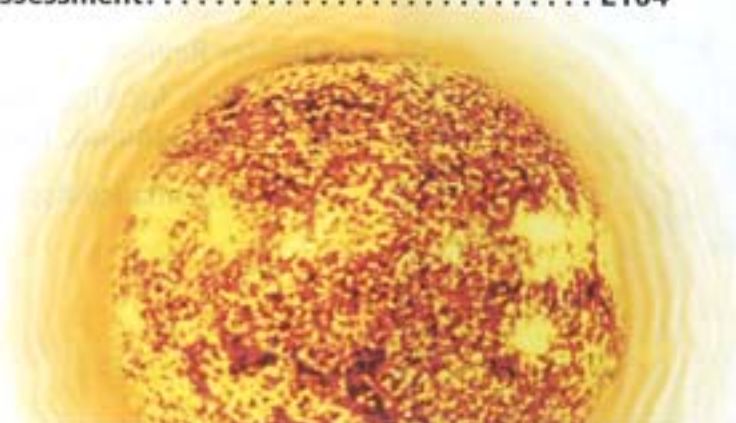
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# FOLDABLES™

by Dinah Zike

## Using Foldables for Data Collection

A Foldables organizer is a 3-D, interactive graphic organizer. It can be a valuable learning tool to help you organize, review, and remember information. You will find suggestions for using Foldables organizers to help you collect and record data in Quick Lab activities throughout this book.

## Basic Shapes

The figures on this page illustrate the basic folds that are the building blocks for all Foldables organizers used in the Quick Labs. The basic folds have friendly names, such as “hot dog fold,” so that you can easily visualize and remember what they look like. Step-by-step folding instructions for each type of Foldables organizer used in the Quick Labs are given on pages R41–R44.



### Basic Shapes



**Hot Dog Fold**



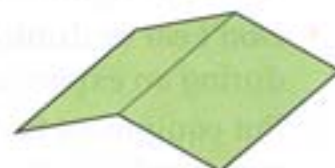
**Shutter Fold**



**Hamburger Fold**



**Valley Fold**



**Mountain Fold**

# Science Safety Tips

## In the Classroom

- Read all directions. Make sure you understand them. When you see **BE CAREFUL!**, be sure to follow the safety rule.
- Listen to your teacher for special safety directions. If you don't understand something, ask for help.
- Wash your hands with soap and water before an activity.
- Be careful around a hot plate. Know when it is on and when it is off. Remember that the plate stays hot for a few minutes after it's turned off.
- Wear a safety apron if you work with anything messy or anything that might spill.
- Wipe up a spill right away or ask your teacher for help.
- Tell your teacher if something breaks. If glass breaks, do not clean it up yourself.
- Keep your hair and clothes away from open flames. Tie back long hair, and roll up long sleeves.
- Keep your hands dry around electrical equipment.
- Don't eat or drink anything during an experiment.
- Put equipment back the way your teacher tells you.
- Dispose of things the way your teacher tells you.



- Wear safety goggles when your teacher tells you to wear them. Wear them when working with anything that can fly into your eyes or when working with liquids.
- Clean up your work area after an activity and wash your hands with soap and water.




## In the Field

- Go with a trusted adult—such as your teacher or a parent or guardian.
- Do not touch animals or plants without an adult's approval. The animal might bite. The plant might be poison ivy or another dangerous plant.

## Responsibility

- Treat living things, the environment, and one another with respect.

***Be a Scientist!***



**What on Earth is this?**



# Volcano!

**S**cience is a way of understanding the world around us. The work of scientists often begins when scientists ask questions about something they observe. Asking and answering questions is the basis of inquiry.

In this section, you will see how scientists use inquiry skills, visual literacy, reading skills, technology and information literacy, math skills, and writing skills as they study volcanoes.



## **Inquiry Skills**

These are the inquiry skills scientists use. You can use these skills, too.

**Observe**

**Infer**

**Classify**

**Measure**

**Use numbers**

**Communicate**

**Predict**

**Interpret data**

**Form a hypothesis**

**Use variables**

**Experiment**

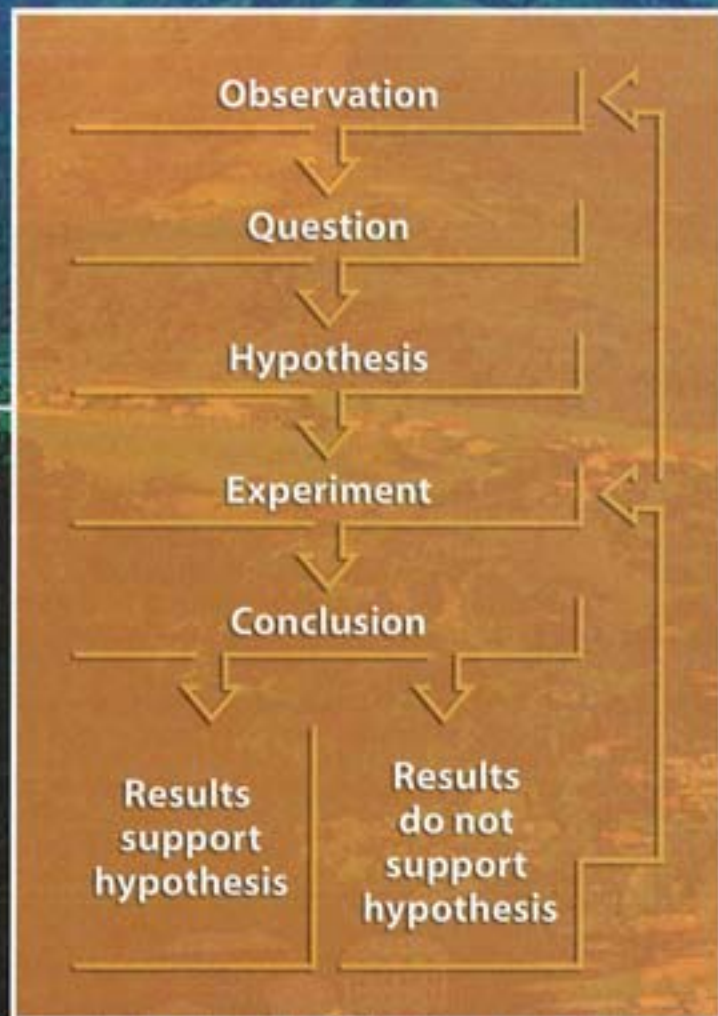
**Make a model**

**Define based on observations**

# Observation > Question and Hypothesis >

**T**he diagram on this page shows what is usually called the “scientific method.” Scientists don’t always follow all these steps in the same order, but they often start with an observation about the world around us.

You, too, are constantly making observations every moment you are awake. You might look out the window to see if it is raining. You might listen for the sound of thunder to find out if a storm is coming.



## Inquiry Skills

When you make observations, you use these skills.

**Observe** Use your senses to learn about an object or event.

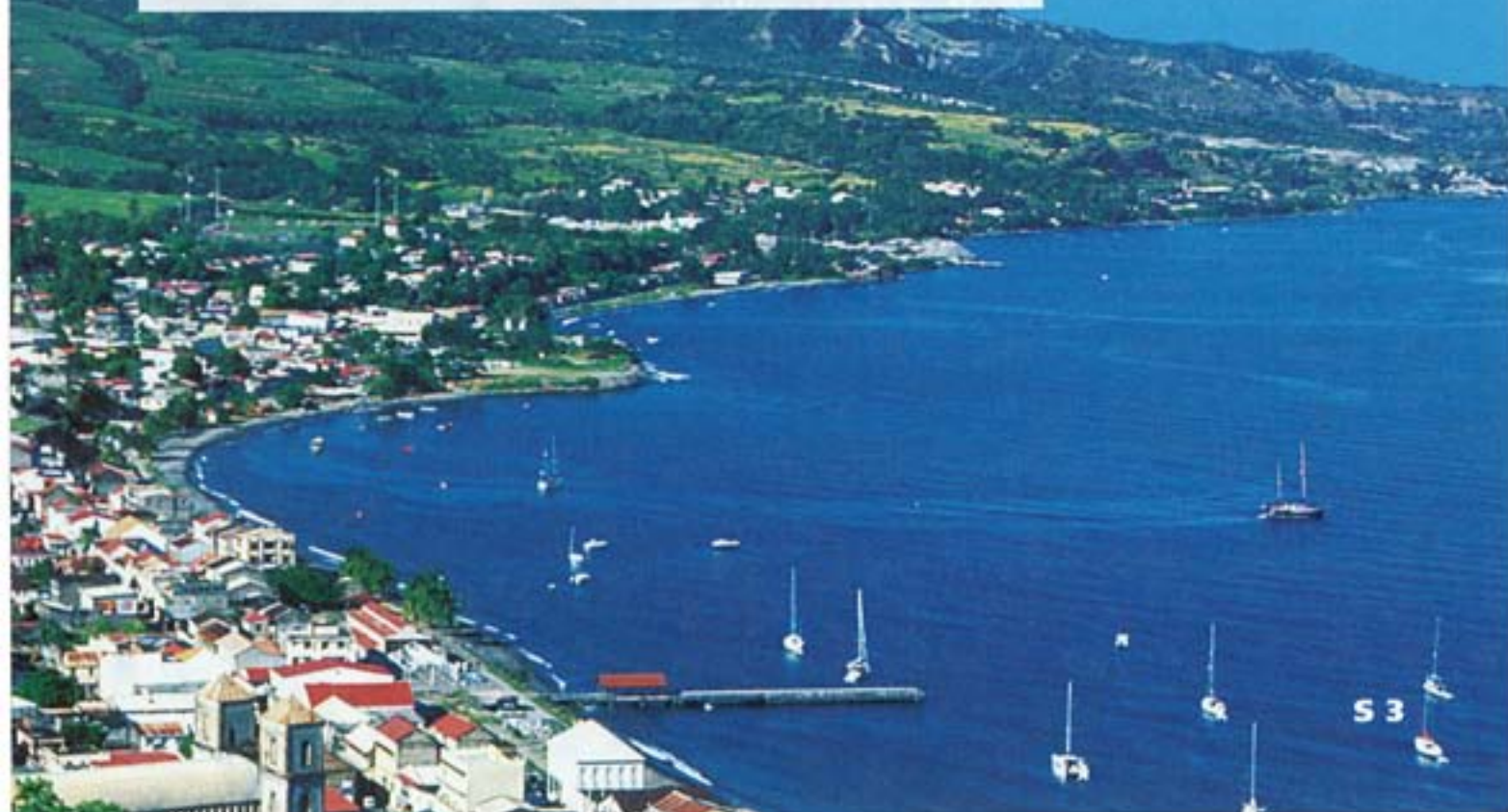
**Classify** Place things that share properties together in groups.

**Measure** Find the size, distance, time, volume, area, mass, weight, or temperature of an object or an event.

## Visual Literacy

More than half the information you get comes from pictures, or visuals. Pictures, maps, graphs, charts, and diagrams are tools. When you use them to improve your observation skills and to understand what you read, you are increasing your visual literacy.

This photograph shows the town of St. Pierre on the island of Martinique. It sits at the base of Mt. Pelée, an active volcano. Why do you think scientists might want to closely observe this volcano?







**T**he work of scientists often starts with an unanswered question. If scientists cannot find an answer to a question, they go one step further. They propose a possible answer that can be tested experimentally. This is known as *forming a hypothesis*. A good hypothesis must

- ▶ be based on what you observe.
- ▶ be testable by performing an experiment.
- ▶ be useful in predicting new findings.

Scientists who study volcanoes are called volcanologists. This volcanologist is examining lava as it flows into the ocean. What do you think happens to the lava when it flows into the ocean water? Form a hypothesis to answer this question.

## Reading in Science

Before doing an experiment to answer a question, scientists often read to try to find the answer or to find what others have learned from their experiments. You can use these reading strategies and skills to help you understand science. While you read, ask yourself these questions:

- ▶ **Compare and Contrast** How are two things alike? How are they different?
- ▶ **Main Idea and Supporting Details** What is the paragraph about? Which details add more information?
- ▶ **Predict** What do you think will happen next?
- ▶ **Cause and Effect** Why did something happen? (This is the cause.) What happened as a result? (This is the effect.)
- ▶ **Draw Conclusions** What do I know from the evidence?
- ▶ **Sequence of Events** What happened first, next, and last?
- ▶ **Summarize** What is this lesson or paragraph about?

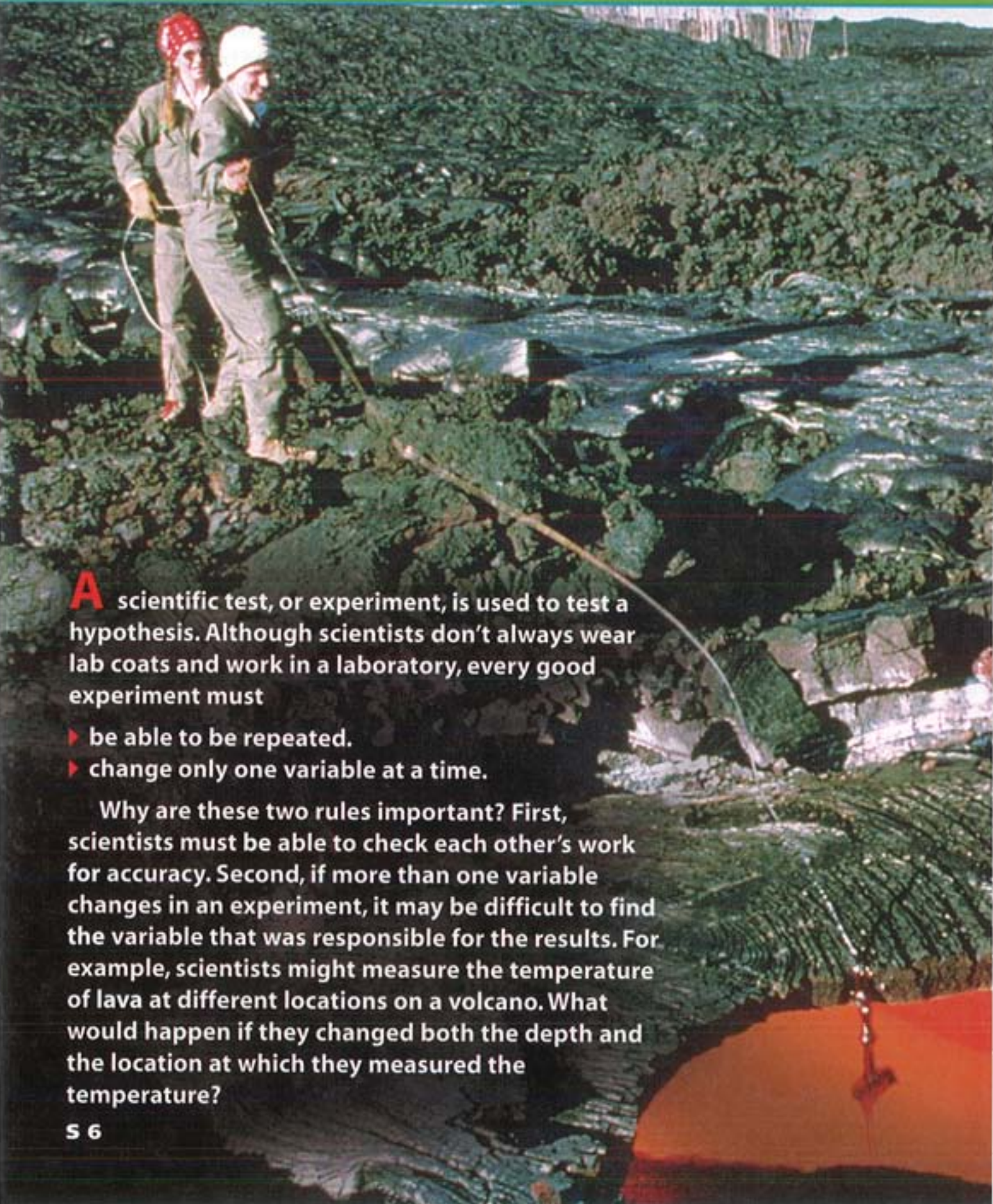
## Inquiry Skills

When you ask questions and form hypotheses, you use these skills.

**Infer** Form an idea from facts or observations.

**Form a hypothesis** Make a statement that can be tested to answer a question.

**Define terms based on observations** Put together a description that is based on observations and experiences.

A photograph showing two scientists in protective gear (green jumpsuits, red and white helmets) standing on a rocky volcanic slope. They are observing a lava flow that is cascading down the slope. The lava is bright orange-red and is being collected into a metal bucket at the bottom of the frame. The background shows a dense forest of green trees.

**A** scientific test, or experiment, is used to test a hypothesis. Although scientists don't always wear lab coats and work in a laboratory, every good experiment must

- ▶ be able to be repeated.
- ▶ change only one variable at a time.

Why are these two rules important? First, scientists must be able to check each other's work for accuracy. Second, if more than one variable changes in an experiment, it may be difficult to find the variable that was responsible for the results. For example, scientists might measure the temperature of lava at different locations on a volcano. What would happen if they changed both the depth and the location at which they measured the temperature?

## Inquiry Skills

When you experiment, you use these skills.

**Experiment** Perform a test to support or disprove a hypothesis.

**Use variables** Identify things in an experiment that can be changed or controlled.

**Predict** State possible results of an event or experiment.

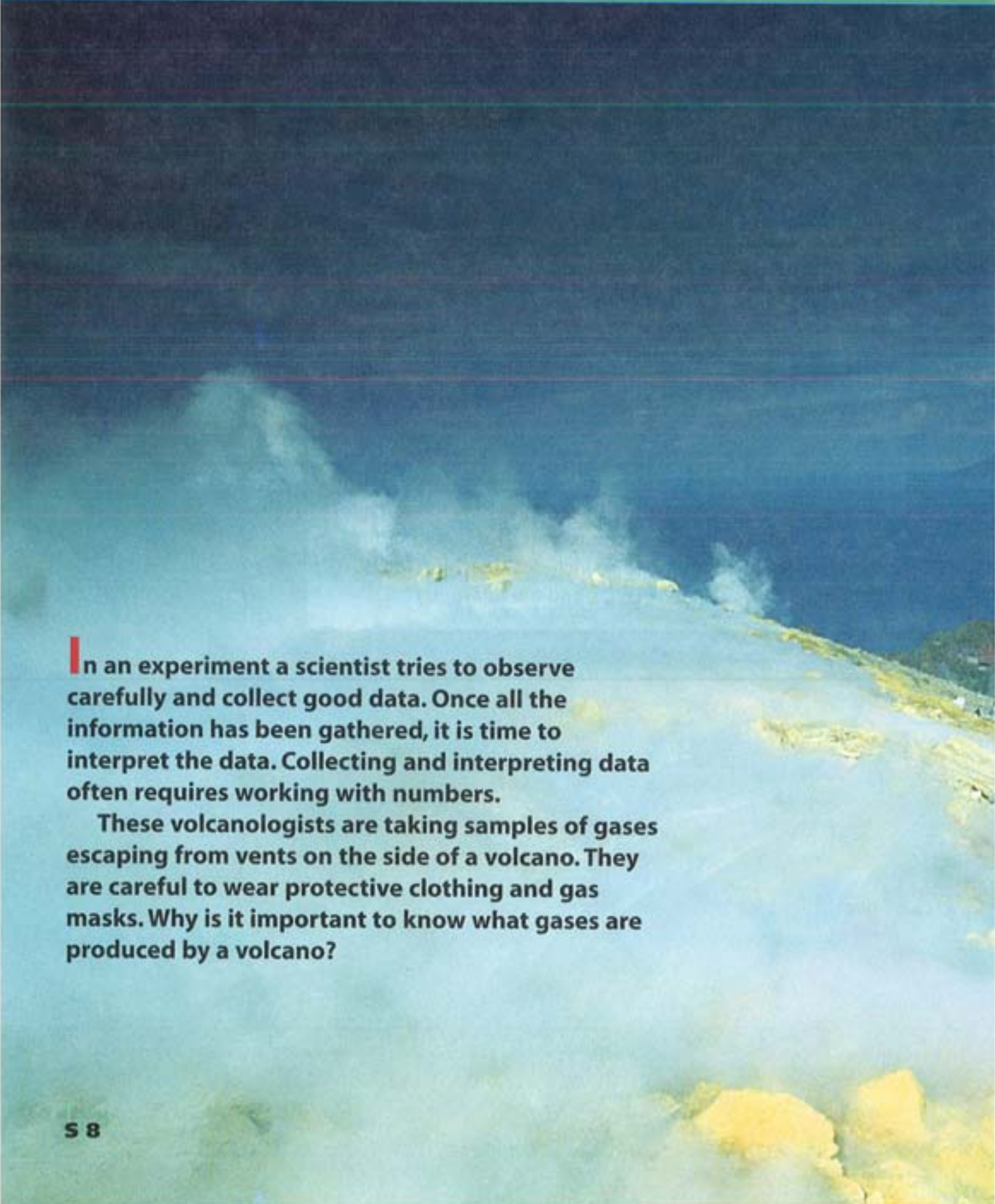
**Make a model** Make something to represent an object or event.

## Technology Literacy

In an experiment, scientists use tools to collect and analyze data. They may use simple tools, such as clocks and rulers. They also use more powerful tools, such as microscopes and computers.

## Information Literacy

Information literacy begins with knowing how to search for and use books, magazines, newspapers, and other media. Today, information literacy also includes searching for information on CD-ROMs, DVDs, and the Internet.



**I**n an experiment a scientist tries to observe carefully and collect good data. Once all the information has been gathered, it is time to interpret the data. Collecting and interpreting data often requires working with numbers.

These volcanologists are taking samples of gases escaping from vents on the side of a volcano. They are careful to wear protective clothing and gas masks. Why is it important to know what gases are produced by a volcano?

## Math Literacy

Scientists often use math skills when they collect and interpret data as part of their experiments. A **Math Link** in each lesson of this book asks you to use several types of math skills, including:

- ▶ **Number Sense and Operations** This includes estimation, addition, subtraction, multiplication, and division.
- ▶ **Measurement** This includes using and converting standard and metric units of size, distance, time, volume, area, mass, weight, or temperature.
- ▶ **Data Analysis and Probability** This includes calculating the likelihood that an event will happen, and making and interpreting bar graphs and line graphs.
- ▶ **Problem Solving** This means using skills and strategies to solve problems.

## Inquiry Skills

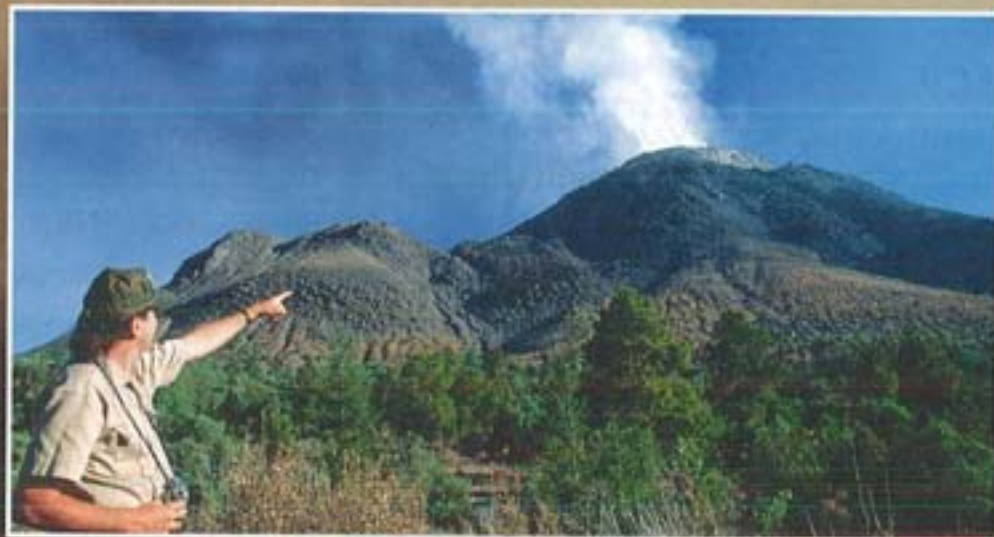
When you collect and interpret data, you use these skills.

**Use numbers** Order, count, add, subtract, multiply, and divide to explain data.

**Measure** Find the size, distance, time, volume, area, mass, weight, or temperature of an object or an event.

**Interpret data** Use the information that has been gathered to answer questions or solve a problem.





**A**fter interpreting the data, it is time to draw a conclusion. A conclusion is a statement about whether or not the hypothesis is valid based on the data collected. Sometimes the data do not support the hypothesis. Perhaps different experiments and observations are needed. A new question may result.

Scientists also tell other scientists, as well as members of the public, about what they have discovered. The United States Geological Survey (USGS) operates five volcano observatories. They observe activity leading to eruption, provide emergency information about future and ongoing eruptions, identify hazardous areas around active and potentially active volcanoes, and improve public understanding of how volcanoes erupt and change our environment.



## Writing in Science

Writing is a tool you can use to communicate, or share information, about science. A **Writing Link** in each lesson of this book asks you to use one of these types of writing:

- ▶ A **Personal Narrative** tells about an event in your life.
- ▶ **Writing a Story** uses characters, setting, and a sequence of events.
- ▶ **Persuasive Writing** tries to get your readers to agree with your opinion.
- ▶ **Explanatory Writing** tells how to make or do something.
- ▶ **Writing That Compares** tells how two things are alike and different.
- ▶ **Expository Writing** presents facts and explains ideas.

## Inquiry Skills

When you draw conclusions and communicate results, you use this skill.

**Communicate** Share information.



# Using Your Book

**Explore Activity**  
**Does Weight Affect How Fast an Object Falls?**

**Materials:** balls, books, ball, golf ball, pencil, paper.

**Procedure:** Wear goggles.

- Read:** Do heavy objects fall faster than lighter objects? Record your prediction and your reasons.
- Plan:** Record what your setup is. Think of you if you have height. Think the two different balls—one light for all—of the same height, and drop them. Record the same time. Repeat. Do three to five trials. Record the time. Repeat.
- Conclude:** Repeat step 2 several more times for the same pair of objects and for other pairs. Try dropping a pencil or an eraser. Do the same thing as you do the balls. Record or observations.

**Drawing Conclusions**

- Observe:** Which ball hit the ground first?
- Observe:** When you dropped different objects, which hit first, the heaviest or the lightest?
- Explain:** Support an explanation for what you observed.
- Extend/Apply/Transfer:** Take two pieces of paper. Can you drop the two pieces of paper at the same time? Try your prediction. Record your results.

The **Explore Activity** is a hands-on way to learn about the lesson. The title is in the form of a question that you will answer in the activity.

The **inquiry skills** in the Explore Activity are the same skills that scientists use.

The last step of the activity provides an opportunity for **further inquiry**.

**QUICK LAB**  
**Predicting Succession**

**Objective:** Predict the succession of plants in a field.

**Procedure:** Study the succession of plants in a field. Record your observations and predictions.

- Observe:** Identify the plants in the field. Record your observations.
- Describe:** Describe the succession of plants in the field. Record your observations.
- Explain:** Explain the succession of plants in the field. Record your observations.
- Predict:** Predict the succession of plants in the field. Record your observations.
- Communicate:** Describe the succession of plants in the field. Record your observations.

You can use different kinds of **Foldables™ organizers** to collect and record data in the Quick Lab.

**Inquiry skills** are also used in the Quick Lab.

**Inquiry Skill BUILDER**  
**SKILL Interpret Data**

**A Weather Station Model**  
A weather station model includes temperature, wind speed, and wind direction. The units at the location of the station. You will interpret the data using the information from the weather station model.

**Procedure:**

- Read:** Read the weather station model. What does it tell you about the weather? Record your answers.
- Interpret Data:** What other information does the weather station model give you?
- Look at the other weather station models. Write a table showing weather conditions for each city.**

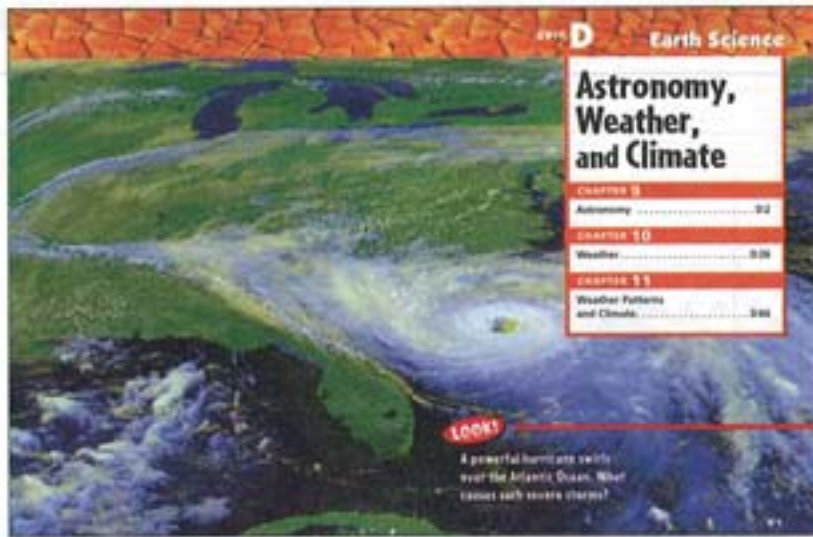
**Drawing Conclusions**

- Compare:** Compare the information in the table you made with the weather station model. Which city is the warmest? Which city is the coldest? Which city is the windiest? Which city is the calmest? Which city is the most humid? Which city is the least humid? Which city is the most sunny? Which city is the least sunny? Record your answers.
- Communicate:** Compare and contrast the weather conditions in the cities.

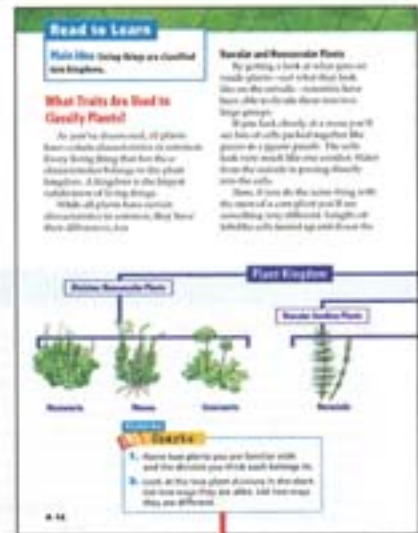
Each **Inquiry Skill Builder** focuses on a specific **inquiry skill**.

Other **inquiry skills** are also reinforced in the Inquiry Skill Builder.

# Learn Through Visuals



Visuals include both **photographs** and **graphics**. This question will help you get information from the photograph at the beginning of each unit of this book.



Throughout all chapters of this book you will get information by reading **graphics**. Graphics are pictures such as:

- diagrams
- charts
- maps
- graphs

This box contains the **Main Idea** of the lesson. Keep the main idea of the lesson in mind as you read.

**Before Reading** Read the large red question before you read the page. Try to answer this question from what you already know.

**During Reading** Look for new **Vocabulary** words highlighted in yellow. Look at the pictures. They will help you understand what you are reading.

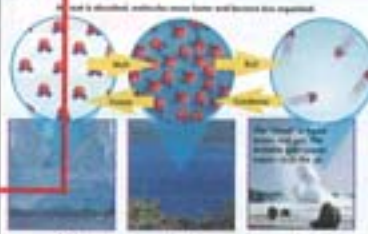
**Read to Learn**

**What Are the States of Matter?**

Water comes from a solid form (ice) and a liquid form (water). If you heat ice enough, it melts and becomes liquid. If you heat liquid water enough, it boils and becomes a gas (water vapor). If you cool a gas enough, it condenses and becomes a liquid. If you cool a liquid enough, it freezes and becomes a solid. This cycle is called the water cycle.

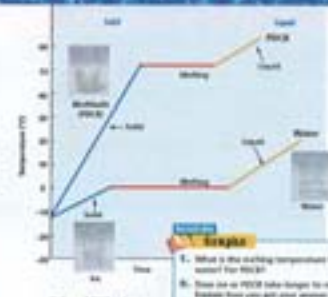
**States of Matter**

Water can exist in three states: solid, liquid, and gas. Each state has different properties. For example, solid water (ice) is less dense than liquid water. This is why ice floats on water.



**What Happens When You Heat or Cool Water?**

When you heat water, it can change from a solid to a liquid (melting) or from a liquid to a gas (boiling). When you cool water, it can change from a gas to a liquid (condensation) or from a liquid to a solid (freezing).



**Sample Questions:**

- What is the boiling temperature for water at 1000 ft?
- How do you know the boiling point is lower at 2000 ft than at 1000 ft?

**What is the boiling point at 2000 ft?**

**After Reading** This arrow points to a question. It will help you check that you understand what you have read. Try to answer the question before you go to the next large red question.

**Why Is Diversity Important?**

Would you rather have a mutt or a purebred dog? Purebred dogs—like other animals—look very much like their parents. They are bred to have certain traits. Mutt, on the other hand, may not look much like either parent. However, they do have a great mix of traits.

A group of dogs made up of mutts is a good example of **genetic diversity**. Genetic diversity refers to a group of the same kind of animal—like dogs—in which there are lots of animals with different traits. A group of mutts is made up of individual dogs with very different traits. Is there an advantage to being a mutt? The answer can be yes! Mutts may be healthier than certain purebred dogs. Some purebred dogs are known to have health problems. Some have hip problems. However, other purebred dogs come from very healthy breeds.

Genetic diversity is important. When an environment changes, only those animals that can adapt to the change will survive. If the population is made up of animals with the same traits—and those traits do not help the animals survive in the new environment—the whole population may die out. This has happened in cheetahs of Africa. However, if the population holds animals with different traits, it is more likely that some will survive to keep the population going.

**READING Summary**

Why is diversity important in an animal population?



On one page in each lesson, you will find a question that practices the **Chapter Reading Skill**. In any chapter, you will find one of these skills:

- compare and contrast
- main idea and supporting details
- predict
- cause and effect
- draw conclusions
- sequence of events
- summarize

# Learn Through Writing and Technology

**Lesson Review**

**Why It Matters**  
You use many different properties of matter every day. Matter that conducts electricity lets you use a reading lamp at night or listen to your favorite CDs. Density allows you to float in a boat on a lake or float through the sky in a hot air balloon. Magnets help you find your way home with a compass.

**Learned** Visit our Web site [www.science.mmhschool.com](http://www.science.mmhschool.com) to do a research project on properties and structure of matter.

**Think and Write**

1. List four properties of matter.
2. If a rock was taken from Earth to the Moon, how would its mass and weight be affected?
3. What if you had rubber bands, wood chips, straight pins, aluminum foil, and glass beads? Using a property of matter, classify these objects. Show your results in a table.
4. **INQUIRY SKILL: Make a Model** Design a strong, light (up to 100 g), cardboard structure to bridge a 30 cm gap. How much weight can it support?
5. **Critical Thinking** Think of the properties of matter you use every day. In what ways are they important to you?

**LINKS**

**WRITING LINK**  
**Personal Narrative** Write about a typical day from the time you get up until the time you go to sleep. Tell the events in order. What properties of matter do you rely on to get to school, do your homework, and play with your friends?

**MATH LINK**  
**Calculate density.** Find some small objects around your classroom or home—a washball, a rock, or even a piece of fruit. Measure its mass and its volume. Use its mass and volume to find its density.

**LITERATURE LINK**  
**Read About Landing That Never Was** to learn about the spacecraft Apollo 13. Try the activities at the end of the book.

**TECHNOLOGY LINK**  
**LOG** Visit [www.science.mmhschool.com](http://www.science.mmhschool.com) for more links.

At the end of every lesson, you can log on to e-Journal for tips and suggestions about how to write a research report.

Think and Write questions at the end of every lesson give you an opportunity to write about what you learned in the lesson.

A Writing Link at the end of every lesson allows you to express yourself through several different types of writing:

- Personal Narrative
- Writing a Story
- Persuasive Writing
- Explanatory Writing
- Writing That Compares
- Expository Writing

A Technology Link at the end of every lesson gives you an opportunity to log on to our Web site [www.science.mmhschool.com](http://www.science.mmhschool.com) for additional links.

**Amazing Stories**

**PLANETARY WEATHER**

Write About It questions on selected Sally Ride Science, Time for Kids, and magazine-style features give you an opportunity to write about what you learned.

A LogOn reference on every Sally Ride Science, Time for Kids, and magazine-style feature allows you to learn more about each topic.

# Prepare for Assessment

**Science Magazine**

## ANIMALS: ICE SURVIVAL

**What Did I Learn?**

1. Water is different from other substances because
  - a. It is less dense as a solid than as a liquid.
  - b. It is more dense as a solid than as a liquid.
  - c. Its molecules are packed more tightly as a solid.
  - d. None of the above.
2. Ice helps plants and animals in ponds survive by
  - a. preventing their bodies.
  - b. providing more insulation of water.
  - c. keeping the temperature low.
  - d. forming a protective covering.

There are **What Did I Learn?** questions on selected Sally Ride Science, Time for Kids, and magazine-style features. Answering the questions gives you an opportunity to practice using a standardized test, multiple choice format.

### Chapter 4 Review

**Vocabulary**

Match each blank with the best word or words from the list.

**1.** A group of made is a good example of animal.

**2.** An animal with \_\_\_\_\_ is found on both the background.

**3.** Looking for something a predator would not be to an example of \_\_\_\_\_.

**4.** The changing color of an animal's body is an example of \_\_\_\_\_.

**5.** A hole is a pit.

**6.** Vertebrates that are adapted to live out of their feet in water and gills of their feet on land and water.

**7.** Humans are classified as \_\_\_\_\_.

**8.** Scavengers \_\_\_\_\_ are animals that eat dead or dying animals.

**9.** The passing down of inherited traits is called \_\_\_\_\_.

**10.** Vertebrates that have dry, thick skin are \_\_\_\_\_.

**11.** Invertebrates that are \_\_\_\_\_ are \_\_\_\_\_.

**12.** Invertebrates that are \_\_\_\_\_ are \_\_\_\_\_.

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A two-page review at the end of each chapter allows you to show what you know using a variety of assessment formats:

- fill-in
- multiple choice
- short answer

### Performance Assessment

#### Name That MINERAL

Your goal is to test your partner's ability to determine their identity.

**What to Do**

1. Make a table with the columns headings shown below.
2. Do the following tests on different samples. Record data in your table for each sample. Estimate what color is its surface? How does it feel? What color is the powder when the mineral breaks?

**What to Do**

1. Look at pictures in a magazine or magazine. Which of the pictures show things that cause air pollution?
2. Create a brochure about air pollution. Your brochure should do three things:
  - a. explain what air pollution is
  - b. name the sources of air pollution in the picture.
  - c. describe how these sources pollute.

**What to Do**

1. Think of a person in a newspaper or magazine. Which of the pictures show things that cause air pollution?
2. Create a brochure about air pollution. Your brochure should do three things:
  - a. explain what air pollution is
  - b. name the sources of air pollution in the picture.
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Performance Assessment at the end of every unit provides an opportunity to demonstrate what you've learned through hands-on activities and projects.