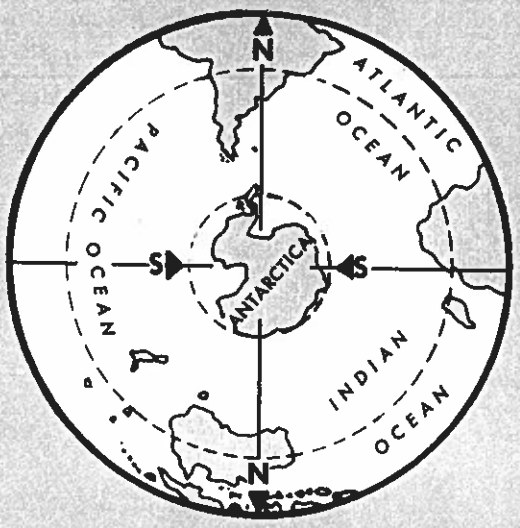
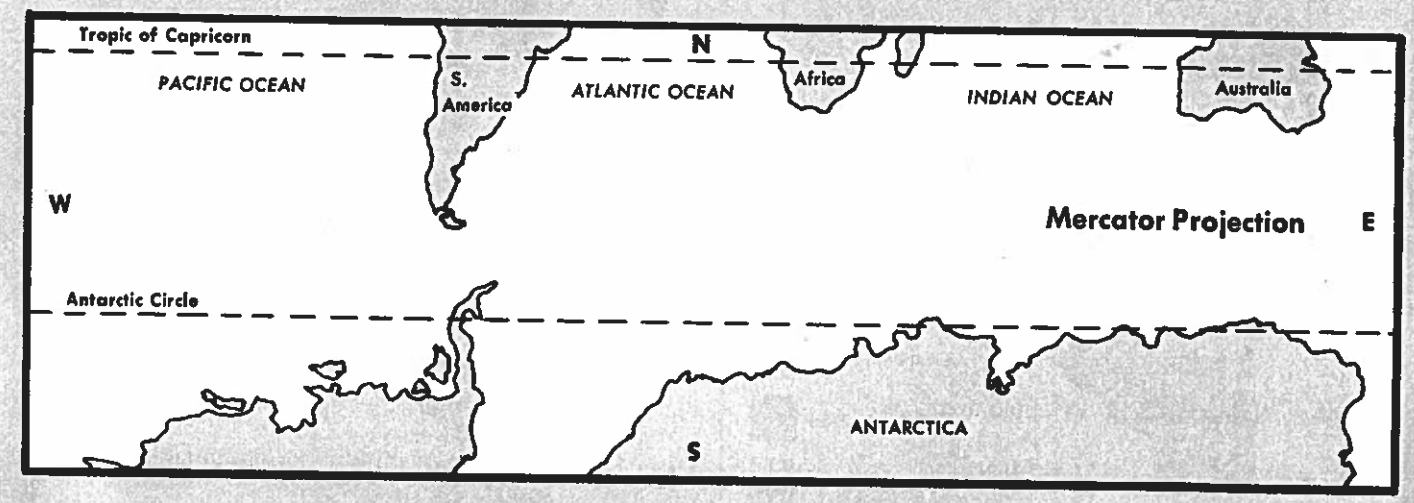
Reading a globe

The maps you have worked with in this book have been **flat maps**. On flat maps, you can locate particular cities and places of interest. You can tell the direction from one place to another, and map scales help you tell the distance. But flat maps **are not** entirely accurate.

The only accurate map of the earth is a **globe**. Because a globe is **round**, like the earth, all parts of the **earth's surface** appear **true to scale**. With a globe, you can study distances and directions accurately. You can also compare the true shapes and sizes of places.

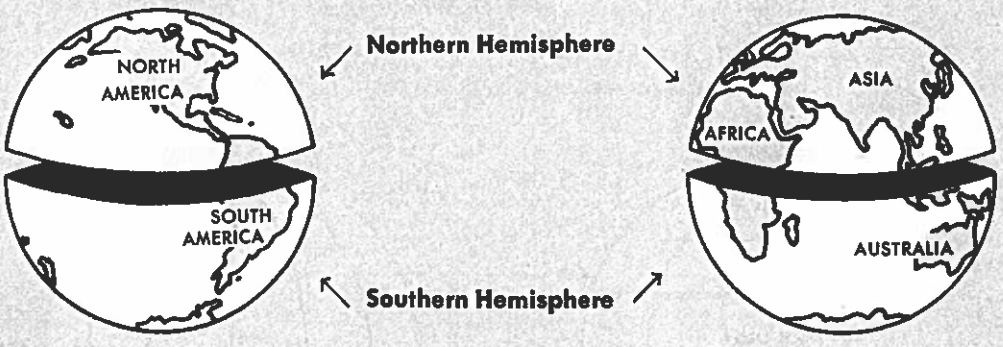
The drawings below show how the continent of **Antarctica** appears on a **globe** and how it appears on some **flat maps**.





On the flat map, Antarctica looks like a long, wide body of land. The globe shows that it is really a large, almost round island. Only the scale on a globe and on a flat map would help you know that these two bodies of land are really the same size.

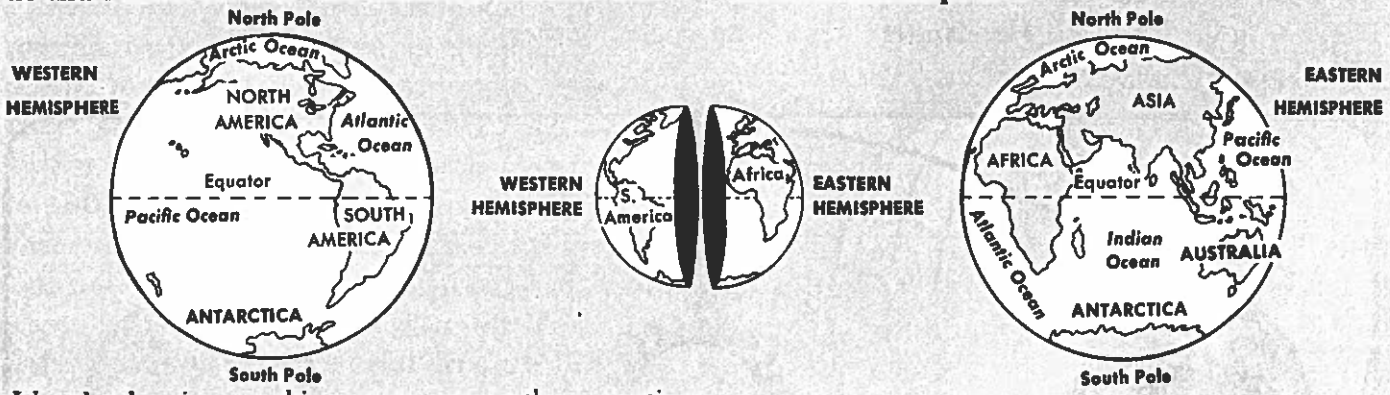
Imaginary lines are drawn on globes and maps to help you locate places. The **equator** is an imaginary line that **circles** a globe at its **widest point**, dividing it in half into the **Northern Hemisphere** and the **Southern Hemisphere.**



Look at both hemispheres of the globes above.

- In which **hemisphere** is **Australia** located? _____
- Through which **three continents** does the **equator** pass?

There is another way to divide the earth into hemispheres. Picture the earth being cut in half from the North Pole to the South Pole through the Atlantic and Pacific Oceans. The continents of North and South America in one half make up the **Western Hemisphere.** The continents of Europe, Asia, Africa, and Australia in the other half make up the **Eastern Hemisphere.**



Use the drawings on this page to answer these questions.

1. In which two hemispheres is North America located? _____ _____
2. In which two hemispheres is Australia located? _____
3. In which three hemispheres is the Arctic Ocean located? _____

Lesson 1.1 The Scientific Method

skeptics: people who are slow to believe something; they ask many questions

solutions: answers to problems

proof: evidence or facts that show something to be true or correct

opinions: beliefs that are based experience, but that aren't necessarily proven to be true

hypothesis: a statement that is assumed to be true so that it can be tested

community: a group of people who are interested in the same thing

"Somewhere, something incredible is waiting to be known."—Carl Sagan, astronomer

What is the difference between a theory and a law?

Without science, we wouldn't know why water freezes, where the sun goes at night, or how our bodies fight disease. We have the answers, though, because someone was curious. Science always begins with a question.

Scientists want to find answers, but a good scientist doesn't stop working until he or she has the only possible answer. This is because the best scientists are **skeptics**. They never say they've solved a scientific problem if other possible **solutions** can be found. Science is based on **proof**. Statements that don't have proof are guesses or **opinions**.

The scientific method is a tool scientists use to prove things. It begins with a question. For example, "Do birds like one color more than another?"

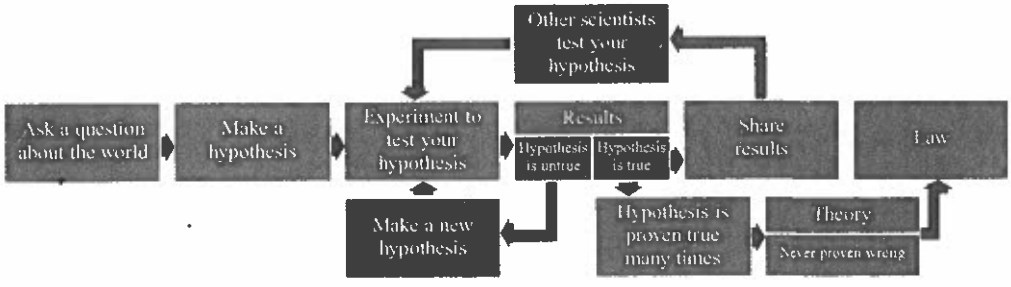
The next step is to answer the question. At this point, it's okay to make a guess or have an opinion. You need something you can test. In the scientific method, your answer is called the **hypothesis**. A hypothesis is a simple statement that can be proven right or wrong. "Birds will eat more food from a red birdfeeder than a blue one" is a good hypothesis.

Now, you can test the hypothesis using experiments and observation. The tests must be designed carefully, though. If too many parts can be changed, it will be hard to tell why you got one result and not another.

If a hypothesis is unable to be proven, the next step is to make a new hypothesis and test it. If the experiments show that a hypothesis is proven, you'll still want to test it again. For example, maybe birds don't see color at all. Something else might have been attracting them to the feeders.

After a scientist finishes experimenting, he or she writes a conclusion. Then, the scientist shares the results with other scientists. The scientific **community** looks closely at the results. This step is very important in the scientific method. Other scientists will try to get the same results. Scientists double- and triple-check each other's work.

A hypothesis must be proven true many times before the scientific community accepts it as true. They're skeptics, remember? If a hypothesis makes it through lots and lots of testing, it will become a theory. A theory might still be proven wrong, but the chances are less. Theories that last for many, many years—and are never proven wrong—become scientific laws.



NAME _____

Circle the letter of the best answer to each question below.

1. A _____ is a theory that has never been proven wrong.
   - **a.** hypothesis
   - **b.** solution
   - **c.** law
   - **d.** opinion
2. Which of the following would make a good hypothesis?
   - **a.** Trees grow better in soil than sand.
   - **b.** Do bees like some flowers better than others?
   - **c.** I think apple juice tastes better than orange juice.
   - **d.** Girls draw better than boys.
3. If an experiment fails to confirm your hypothesis, what is the next step?
   - **a.** Find another solution.
   - **b.** Make another hypothesis.
   - **c.** Keep trying the same experiment.
   - **d.** Use a different theory.

Write your answers on the lines below.

4. Explain why your answer to question 2 makes a good hypothesis.

   _____

5. Why should a scientist always share the results of his or her experiments?

   _____

   _____

6. Number the steps of the scientific method in the correct order.

   _____ hypothesis

   _____ question

   _____ experiment

   _____ law

   _____ theory

   _____ share results

Name _____ Date _____

$3\overline{)281}$ → 93_{R2}

$-27\downarrow$

11

$-\ 9$

2

$8\overline{)765}$

$2\overline{)45}$

$8\overline{)735}$

$4\overline{)325}$

$6\overline{)449}$

$8\overline{)746}$

$7\overline{)435}$

$2\overline{)153}$