

Volcanoes



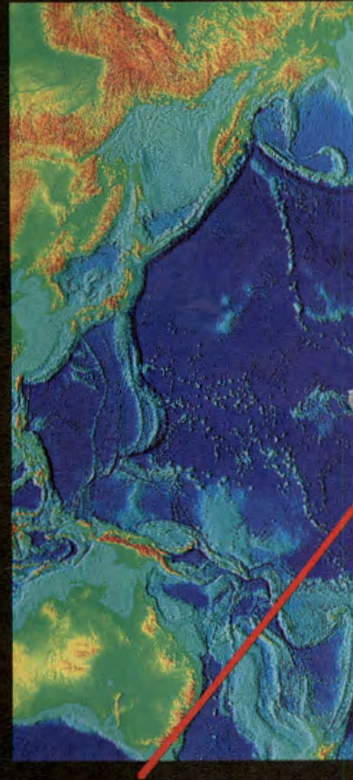
Standards to Achieve

Reading

- Understand text features (R2.1)
- Use order to analyze text (R2.2)
- Discern main ideas (R2.3)

The World of Volcanoes

From Hawaii to the Pacific Northwest, from Guatemala to Iceland, Seymour Simon's *Volcanoes* will take you on a world tour. You'll see more than mountain peaks. The heart of the story is about the part of the earth that's deep underground, where the heat turns the earth's **crust** into **molten** rock.



Mauna Loa

Molten rock erupts as flowing **lava** from Hawaii's Mauna Loa.





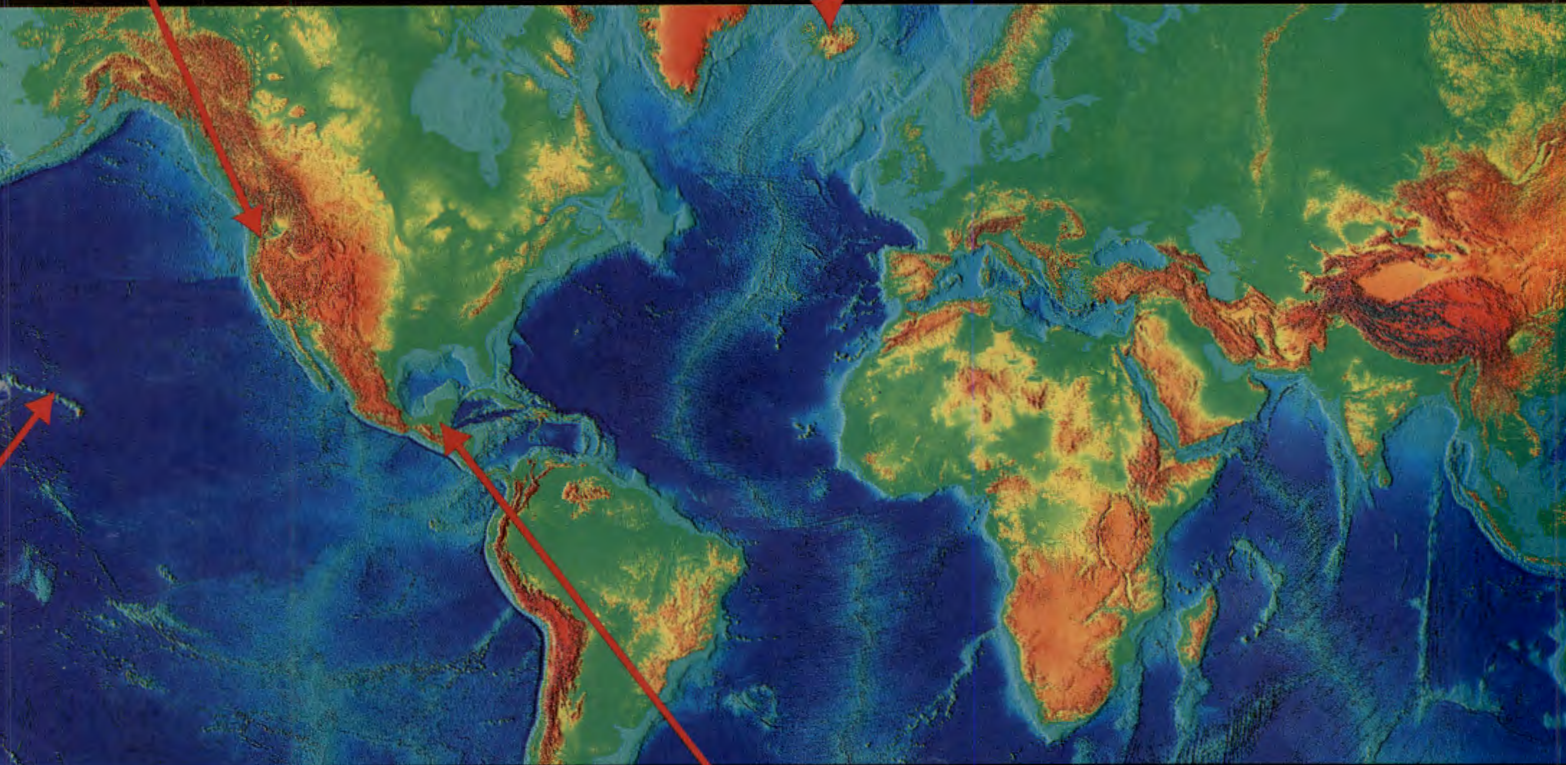
Mount St. Helens

One of many volcanoes in the Pacific Northwest, Mount St. Helens cooled down to form a hard lava dome in its **crater**.



Surtsey

An undersea volcano near Iceland created a new island, Surtsey.



Fuego and Acatenango

These volcanoes in Guatemala are built of **cinders** and ash.



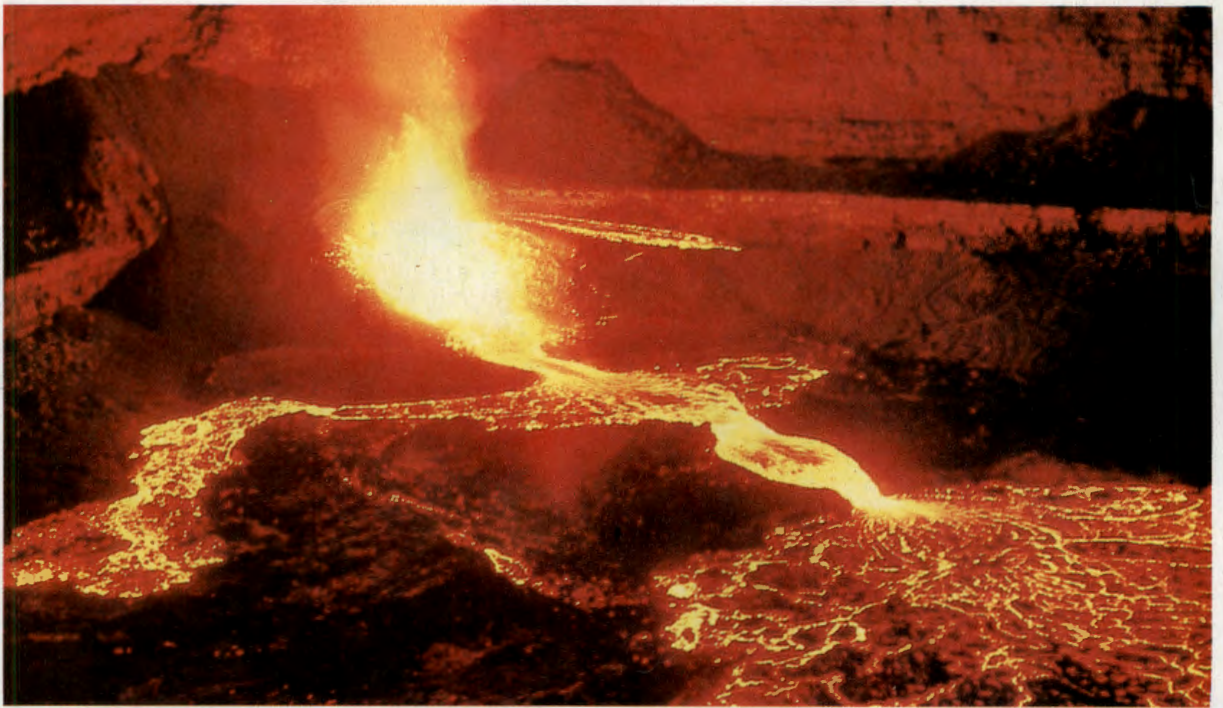


VOLCANOES

S E Y M O U R S I M O N

Strategy Focus

In this selection, Seymour Simon gives you lots of information about volcanoes and how they form. As you read, **monitor** your understanding, and reread or use the photos and the map to **clarify**.



Throughout history, people have told stories about volcanoes. The early Romans believed in Vulcan, their god of fire. They thought that Vulcan worked at a hot forge, striking sparks as he made swords and armor for the other gods. It is from the Roman god Vulcan that we get the word *volcano*.

The early Hawaiians told legends of the wanderings of Pele, their goddess of fire. Pele was chased from her homes by her sister Namaka, goddess of the sea. Pele moved constantly from one Hawaiian island to another. Finally, Pele settled in a mountain called Kilauea, on the big island of Hawaii. Even though the islanders tried to please Pele, she burst forth every few years. Kilauea is still an active volcano.

In early times, no one knew how volcanoes formed or why they spouted fire. In modern times, scientists began to study volcanoes. They still don't know all the answers, but they know much about how a volcano works.

Our planet is made up of many layers of rock. The top layers of solid rock are called the crust. Deep beneath the crust, it is so hot that some rock melts. The melted, or molten, rock is called magma.

Volcanoes are formed by cracks or holes that poke through the earth's crust. Magma pushes its way up through the cracks. This is called a volcanic eruption. When magma pours forth on the surface it is called lava. In the above photograph of an eruption, you can see great fountains of boiling lava forming fiery rivers and lakes. As lava cools, it hardens to form rock.



A volcano can be two things: a hole in the ground that lava comes through, or a hill or mountain formed by the lava. Mount Rainier in the state of Washington is a volcano even though it has not erupted since 1882.

Not far from Mount Rainier (top, right) is Mount St. Helens (bottom, left). Native Americans and early settlers in the Northwest had seen Mount St. Helens puff out some ashes, steam, and lava in the mid-1800s. Yet for more than a century, the mountain seemed quiet and peaceful.

In March 1980 Mount St. Helens awakened from its long sleep. First there were a few small earthquakes that shook the mountain. Then on March 27 Mount St. Helens began to spout ashes and steam. Each day brought further quakes, until by mid-May more than ten thousand small quakes had been recorded. The mountain began to swell up and crack.

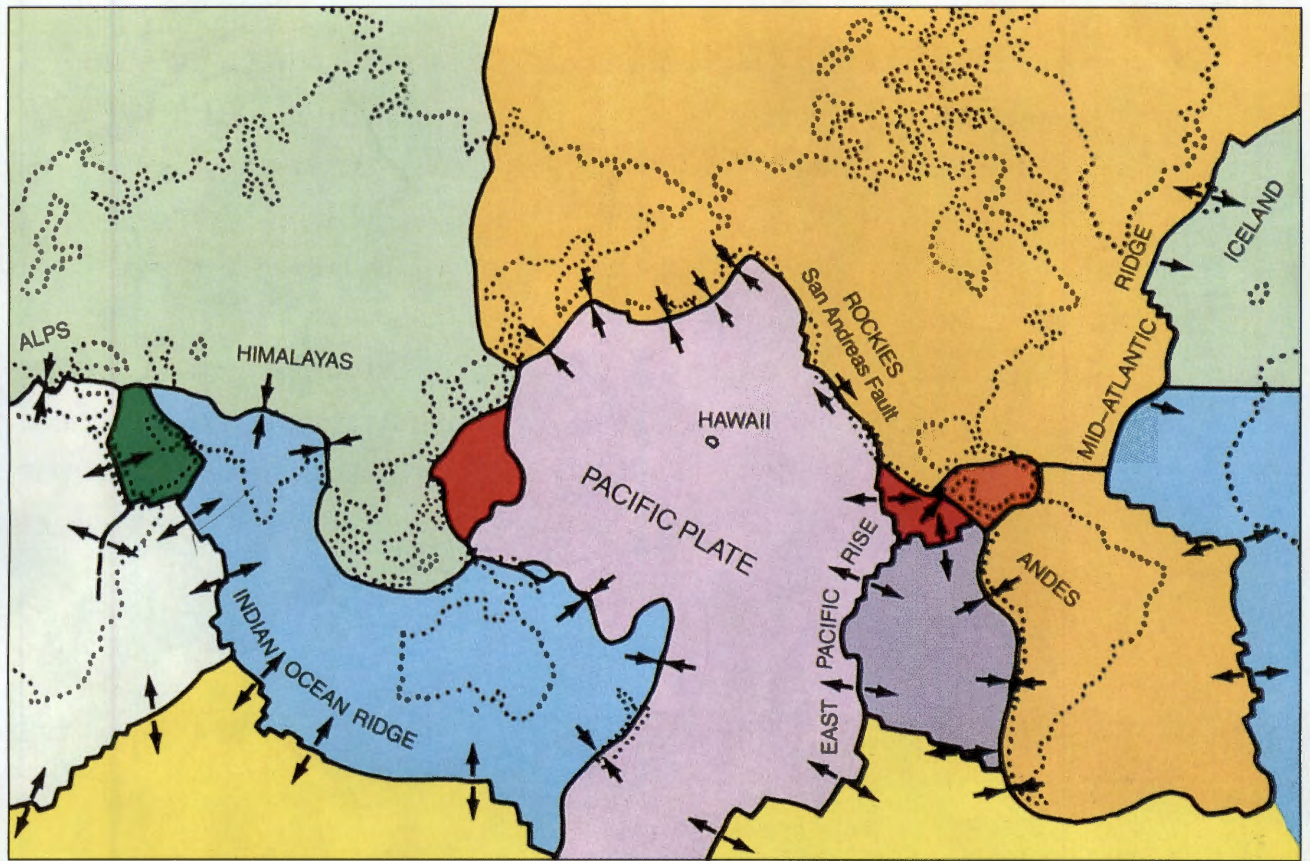
Sunday May 18 dawned bright and clear. The mountain seemed much the same as it had been for the past month. Suddenly, at 8:32 A.M., Mount St. Helens erupted with incredible force. The energy released in the eruption was equal to ten million tons of dynamite.



The eruption of Mount St. Helens was the most destructive in the history of the United States. Sixty people lost their lives as hot gases, rocks, and ashes covered an area of two hundred thirty square miles. Hundreds of houses and cabins were destroyed, leaving many people homeless. Miles of highways, roads, and railways were badly damaged. The force of the eruption was so great that entire forests were blown down like rows of matchsticks.

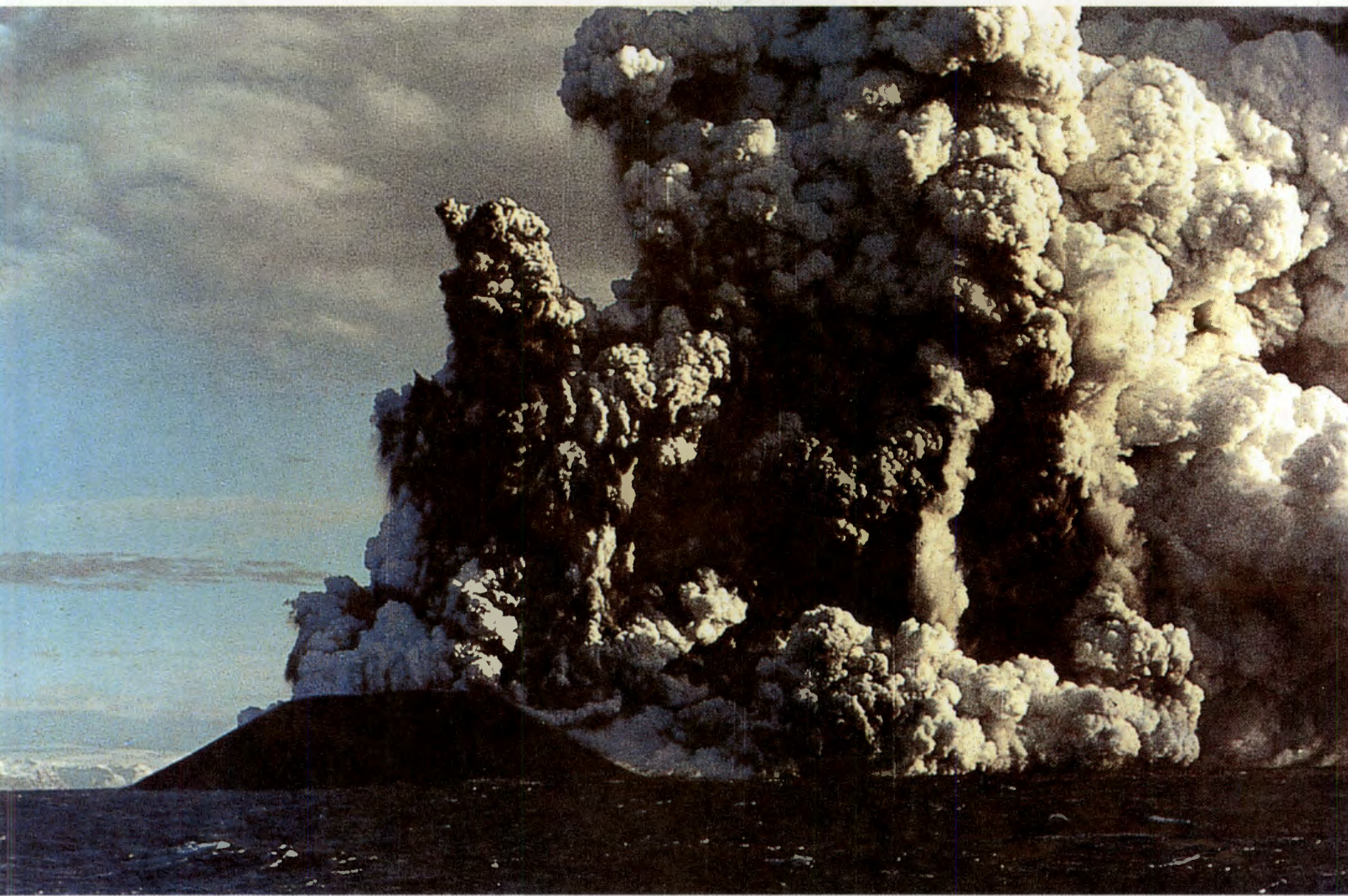
Compare the way Mount St. Helens looked before and after the eruption. The entire top of the mountain was blown away. In its place is a huge volcanic crater. In 1982 the mountain and the area around it were dedicated as the Mount St. Helens National Volcanic Monument. Visitor centers allow people to view the volcano's astonishing power.





Volcanoes don't just happen anywhere. The earth's crust is broken into huge sections like a giant cracked eggshell. The pieces of the crust are called plates. The United States, Canada, and Mexico and part of the North Atlantic Ocean are all on the North American plate. Almost all the volcanoes in the world erupt in places where two plates meet.

Down the middle of the North Atlantic Ocean, two plates are slowly moving apart. Hot magma pushes up between them. A chain of underwater volcanoes runs along the line where the two plates meet. Some of the underwater volcanoes have grown so high that they stick up from the ocean floor to make islands.



Iceland is a volcanic island in the North Atlantic. In 1963, an area of the sea near Iceland began to smoke. An undersea volcano was exploding and a new island was being formed. The island was named Surtsey, after the ancient Norse god of fire.

Ten years after the explosion that formed Surtsey, another volcano erupted near Iceland. It was off the south coast of Iceland on the island of Heimaey. Within six hours of the eruption, more than 5,000 people were taken off the island to safety. After two months, hundreds of buildings had burned down and dozens more had been buried in the advancing lava. Then the volcano stopped erupting. After a year's time, the people of Heimaey came back to reclaim their island with its new 735-foot volcano.

Most volcanoes and earthquakes are along the edges of the large Pacific plate. There are so many that the shoreline of the Pacific Ocean is called the "Ring of Fire." But a few volcanoes are not on the edge of a plate. The volcanoes in the Hawaiian Islands are in the middle of the Pacific plate.

A million years ago, magma pushed up through cracks in the Pacific plate. Over the years, eruption followed eruption. Little by little, thin layers of lava hardened, one atop another. Thousands of eruptions were needed to build mountains high enough to reach from the deep sea bottom and appear as islands.

The largest Hawaiian volcano is Mauna Loa. It is seventy miles long and rises thirty thousand feet from the ocean floor. It is still growing. Every few years, Mauna Loa erupts again.

Hawaiian volcano lava usually bubbles out quietly to form rivers or lakes, or spouts a few hundred feet in the air in a fiery fountain. Hawaiian volcanoes erupt much more gently than did Surtsey or Mount St. Helens. Only rarely does a Hawaiian volcano throw out rock and high clouds of ash.





Steam clouds billow as a flow of hot lava enters the sea. Hawaii is constantly changing as eruptions add hundreds of acres of new land to the islands. In other parts of the shoreline, old lava flows are quickly weathered by the waves into rocks and black sand.

Hawaiian lava is thin and flows quickly. In some lava rivers, speeds as high as thirty-five miles per hour have been measured. In an eruption in 1986, a number of houses were threatened by the quick-moving lava. Fire fighters sprayed water on the lava to slow down its advance.

When lava cools and hardens, it forms volcanic rocks. The kinds of rocks formed are clues to the kind of eruption. The two main kinds have Hawaiian names. Thick, slow-moving lava called *aa* (AH-ah) hardens into a rough tangle of sharp rocks. Thin, hot, quick-moving lava called *pahoehoe* (pah-HO-ee-ho-ee) forms a smooth, billowy surface.





Earth scientists have divided volcanoes into four groups. Shield volcanoes, such as Mauna Loa and Kilauea, have broad, gentle slopes shaped like an ancient warrior's shield.

Cinder cone volcanoes look like upside-down ice cream cones. They erupt explosively, blowing out burning ashes and cinders. The ashes and cinders build up to form the cone shape. The cinder cone volcano to the near left erupted in Guatemala, Central America, in 1984. The cinder cone volcanoes in the background are still smoking from earlier eruptions.





Most of the volcanoes in the world are composite or strato-volcanoes. Strato-volcanoes are formed by the lava, cinders, and ashes of an eruption. During an eruption, ashes and cinders fall to the ground. The eruption quiets down and lava slowly flows out, covering the layer of ashes and cinders. Further eruptions add more layers of ashes and cinders, followed by more layers of lava. Mount Shasta (above) in California and Mount Hood in Oregon are strato-volcanoes. They are still active even though they have not erupted for many years.



The fourth kind of volcano is called a dome volcano. Dome volcanoes have thick, slow-moving lava that forms a steep-sided dome shape. After an eruption, the volcano may be plugged with hardened lava. The plug prevents the gases from escaping, like a cork in a bottle of soda water. As the pressure builds up, the volcano blows its top, as Mount St. Helens did. Lassen Peak in California is a dome volcano that erupted violently in 1915. You can see the huge chunks of volcanic rock near the summit.

Around the world there are many very old volcanoes that no longer erupt. These dead volcanoes are called extinct. Crater Lake in Oregon is an extinct volcano. Almost seven thousand years ago, Mount Mazama in Oregon erupted, sending out a thick blanket of ashes that covered the ground for miles around. Then the entire top of the volcano collapsed. A huge crater, called a caldera, formed and was later filled with water. Crater Lake reaches a depth of two thousand feet, the deepest lake in North America.



After a volcano erupts, everything is buried under lava or ashes. Plants and animals are nowhere to be found. But in a few short months, life renews itself. Plants grow in the cracks between the rocks. Insects and other animals return. Volcanoes do not just destroy. They bring new mountains, new islands, and new soil to the land. Many good things can come from the fiery explosions of volcanoes.



Meet the AUTHOR



Seymour Simon

“Many of the books I write are really in the nature of guidebooks to unknown territories. Each territory has to be discovered again by children venturing into it for the first time.”

“I’m always working on several books at the same time. I may be writing a book and researching another book and writing for information about a third book and thinking about plans for still a fourth book.”

FACT FILE

- Graduated from the Bronx High School of Science
- President of the Junior Astronomy Club at New York’s Museum of Natural History
- Taught science and creative writing in New York City public schools, 1955–1979
- First published work: a magazine article about the moon
- Author of more than two hundred books in thirty years

Internet



For more information about Seymour Simon, visit Education Place.

www.eduplace.com/kids



Simon’s range of interests shows in his titles, such as: *Our Solar System*, *The Universe*, *Tornadoes*, *Sharks*, *Gorillas*, *Out of Sight: Pictures of Hidden Worlds*, *The Paper Airplane Book*, and the *Einstein Anderson, Science Detective* series.

Responding



Think About the Selection

1. Why do you think people have used folktales to explain volcanoes?
2. Find examples in the selection of both the helpful and harmful things that volcanoes do.
3. Why do you think earthquakes often happen just before volcanoes?
4. Of the different volcanoes mentioned in the selection, which one impressed you the most? Why?
5. Which word best describes a volcano for you: *beautiful*, *scary*, *exciting*, *ugly*, or some other word? Explain why.
6. What do you think would be the best and worst things about studying volcanoes for a living?
7. **Connecting/Comparing** Compare the conditions that cause a volcanic eruption with those that cause a tornado. Think about how, where, and when they happen, and how much warning people have.



Explaining

Write a Travel Brochure

Use information from the selection to create a travel brochure for a tour of the world's volcanoes. Explain where the tour will go and what volcanoes you will see.

Tips

- Fold a sheet of paper into three panels.
- Describe the tour on the inside panels and illustrate the outside panels.
- Check your spelling and capitalize all proper nouns.

Science

Create a Poster

Use information from Seymour Simon's *Volcanoes* to make a poster. You might show how magma rises to erupt as lava, or show the four different kinds of volcanoes.



Social Studies

Create a Fact File

With classmates, create a volcano fact file. Using the information in *Volcanoes*, each person chooses a country or state, such as Iceland or Hawaii, and lists the volcanoes for that place, along with a brief description of the volcanoes and a small map.

Bonus: Find information about the volcanoes of a country not mentioned in the selection, such as Italy or Japan. Add a fact file about that place.

Internet

Go on a Web Field Trip

Connect to Education Place and explore a weather center, science museum, and other places to observe nature's fury. www.eduplace.com/kids

Skill: How to Read a Folktale

- 1 Notice that the **characters** are simple — good or bad, wise or foolish.
- 2 Notice that the **action** moves quickly, in brief episodes.
- 3 Look for information about the **country** the folktale comes from.

California
Standards

Standards to Achieve

Reading

- **Determine character traits (R3.3)**
- **Evaluate patterns/symbols (R3.6)**

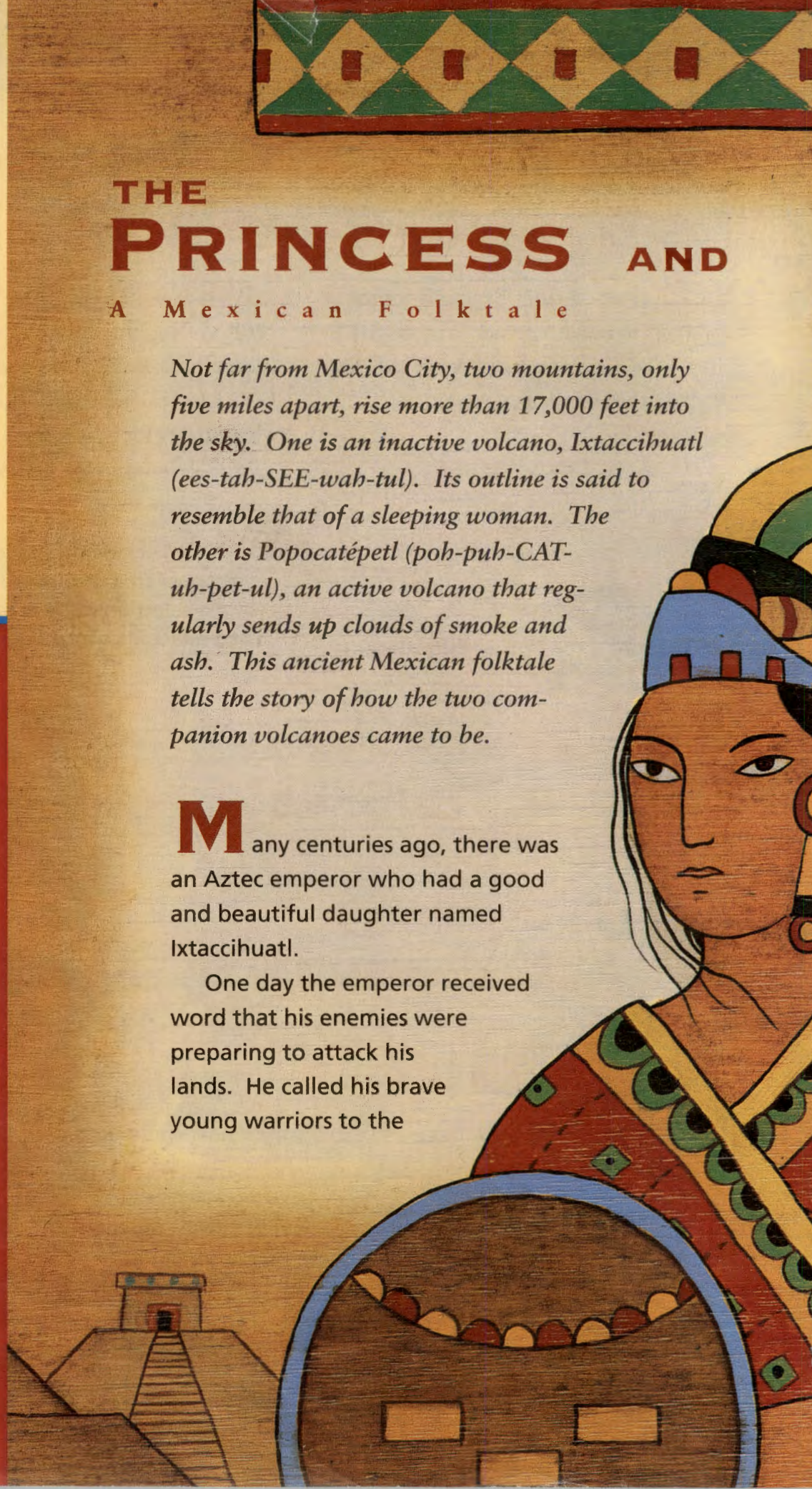
THE PRINCESS AND

A Mexican Folktale

Not far from Mexico City, two mountains, only five miles apart, rise more than 17,000 feet into the sky. One is an inactive volcano, Ixtaccihuatl (ees-tah-SEE-wah-tul). Its outline is said to resemble that of a sleeping woman. The other is Popocatepetl (poh-puh-CAT-uh-pet-ul), an active volcano that regularly sends up clouds of smoke and ash. This ancient Mexican folktale tells the story of how the two companion volcanoes came to be.


Many centuries ago, there was an Aztec emperor who had a good and beautiful daughter named Ixtaccihuatl.

One day the emperor received word that his enemies were preparing to attack his lands. He called his brave young warriors to the






THE WARRIOR



palace and said, "Since I am old, I can no longer lead you in battle. Name the bravest warrior among you to serve as the chief of our Aztec army. If he can defeat the enemy and establish peace in the land, I will give him my throne and my daughter's hand in marriage."

"Popo is the bravest, strongest warrior. He should be our chief!" shouted all the warriors but one.

"Very well. Popocatépetl, you are the chief," said the emperor. "May the gods lead you to victory."



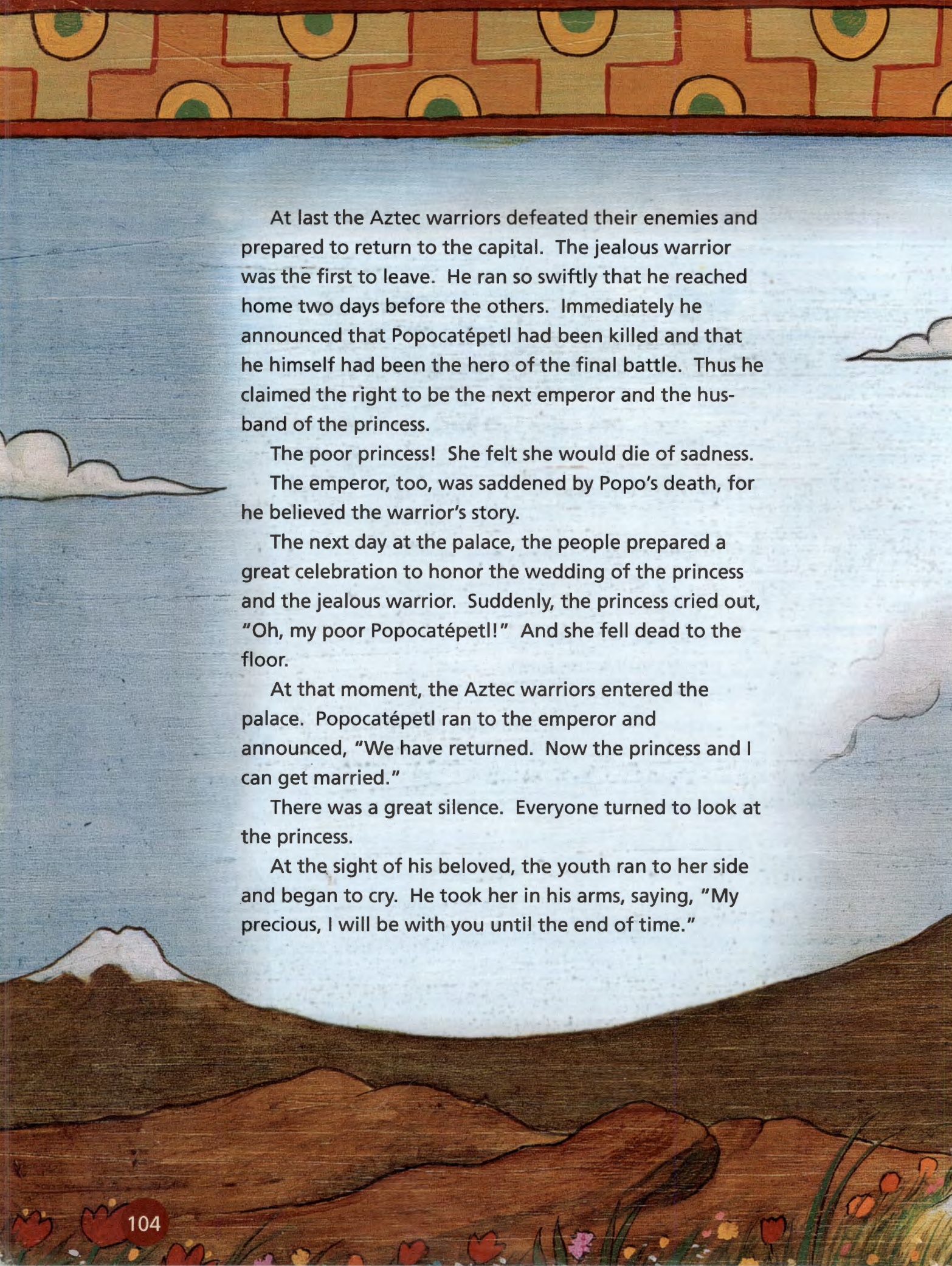
One among the warriors was very jealous of Popocatépetl. This warrior thought that he himself should be the chief. But he didn't say a word to anyone about his thoughts.

It was a great secret that Popocatépetl and the emperor's daughter had fallen in love. Before leaving for battle, the young chief went to the garden to say good-bye to his beloved princess.

"I will soon be back, my love," said the youth to the princess. "Then we will be married."

With these words, Popocatépetl left for a long and brutal war. No one fought as bravely as the young Aztec chief.





At last the Aztec warriors defeated their enemies and prepared to return to the capital. The jealous warrior was the first to leave. He ran so swiftly that he reached home two days before the others. Immediately he announced that Popocatépetl had been killed and that he himself had been the hero of the final battle. Thus he claimed the right to be the next emperor and the husband of the princess.

The poor princess! She felt she would die of sadness.

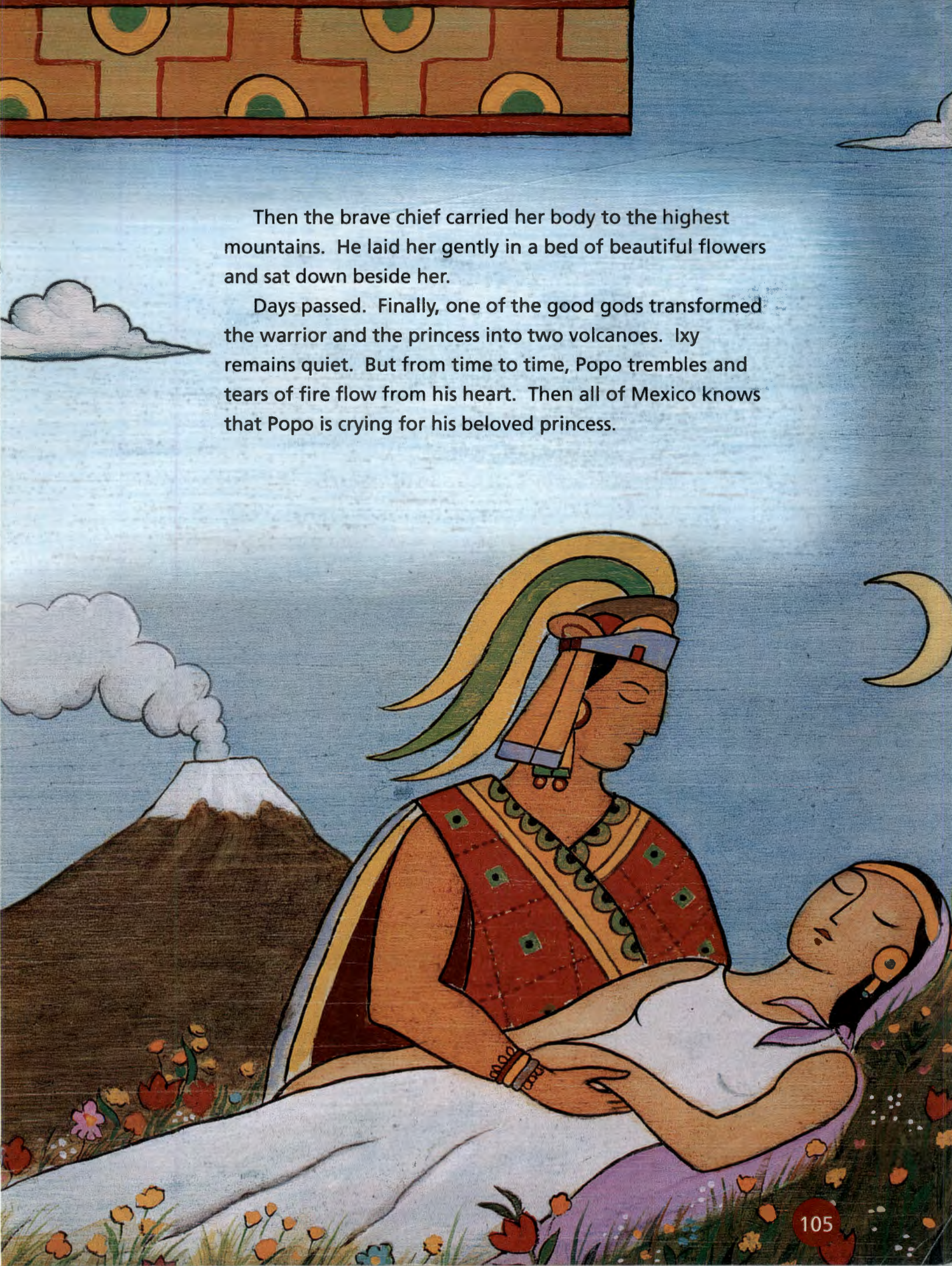
The emperor, too, was saddened by Popo's death, for he believed the warrior's story.

The next day at the palace, the people prepared a great celebration to honor the wedding of the princess and the jealous warrior. Suddenly, the princess cried out, "Oh, my poor Popocatépetl!" And she fell dead to the floor.

At that moment, the Aztec warriors entered the palace. Popocatépetl ran to the emperor and announced, "We have returned. Now the princess and I can get married."

There was a great silence. Everyone turned to look at the princess.

At the sight of his beloved, the youth ran to her side and began to cry. He took her in his arms, saying, "My precious, I will be with you until the end of time."



Then the brave chief carried her body to the highest mountains. He laid her gently in a bed of beautiful flowers and sat down beside her.

Days passed. Finally, one of the good gods transformed the warrior and the princess into two volcanoes. Ixy remains quiet. But from time to time, Popo trembles and tears of fire flow from his heart. Then all of Mexico knows that Popo is crying for his beloved princess.

Choosing the Best Answer

Many tests have multiple-choice items, or items with a question and three to five answer choices. How do you choose the best answer? Look at this sample test item for *Eye of the Storm: Chasing Storms with Warren Faidley*. The correct answer is shown. Use the tips to help you answer this kind of test question.

Tips

- Read the directions carefully to make sure you know how to mark your answer.
- Read the question and all the answer choices.
- Look back at the selection if you need help.
- Go back and check all your answers if you have time.

Read the question. Choose the best answer and fill in the circle in the answer row.

- 1 What does the calendar on page 67 of *Eye of the Storm* explain?
- A It explains where storms take place.
 - B It explains how storms form.
 - C It explains what time of year storms take place.
 - D It explains how often storms take place.

ANSWER ROW 1 (A) (B) ● (D)

Now see how one student figured out the best answer.

I am looking for the answer that best describes the calendar in *Eye of the Storm*. I look back at the calendar. It shows three kinds of storms under different months of the year.

I reread the answer choices. I see that A and B aren't correct because they aren't about time. The choice for D comes close, but C is more exact. Now I see why C is the best answer.

