

Mae Jemison: Space Scientist

MAE JEMISON
Space Scientist



By Gail Sakurai

California
Standards

Standards to Achieve

Reading

- Use roots and affixes (R1.4)
- Discern main ideas (R2.3)

Exploring Space

When the Soviet Union launched the first artificial **satellite** in the 1950s, the space race between the Russians and the Americans began. Since then, there have been many historic space events, including the first mission to have an African American female astronaut aboard, described in *Mae Jemison: Space Scientist*.

1957

The Soviet Union launches the first artificial satellite, *Sputnik 1*.



1961

The first human in space is Russian cosmonaut Yuri Gagarin aboard *Vostok 1*. The first American in space is Alan Shepard (below) aboard *Freedom 7*.

1962

John Glenn aboard *Friendship 7* is the first American to **orbit** the Earth.



1963

Russian Valentina Tereshkova is the first woman in space.



● **1999**

Eileen Collins is the first female commander of a shuttle mission.

● **1995**

Cosmonaut Valery Polyakov completes a record 488 days in space aboard the Russian space station *Mir*.

● **1992**

Mission specialist Mae Jemison (left) is the first African American woman in space.

● **1983**

Sally Ride is the first American woman in space.

● **1981**

The first **reusable spacecraft**, the space shuttle *Columbia*, is launched.

● **1969**

Americans Neil Armstrong and Edwin "Buzz" Aldrin (right) walk on the moon during the *Apollo 11* mission.



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Strategy Focus

As you read about space missions in this selection, **monitor** your understanding. If you do not understand something, reread or read ahead to clarify.



THREE . . .

TWO . . .

One . . .

Liftoff!

The space shuttle *Endeavour* thundered into the morning sky above Kennedy Space Center. Higher and higher it soared over the Atlantic Ocean. A few minutes later, *Endeavour* was in orbit around Earth.

Aboard the spacecraft, astronaut Mae Jemison could feel her heart pounding with excitement. A wide, happy grin split her face. She had just made history. She was the first African-American woman in space. The date was September 12, 1992.

But Mae wasn't thinking about dates in history books. Her thoughts were of the wonder and adventure of space travel. "I'm closer to the stars — somewhere I've always dreamed to be," Mae said during a live television broadcast from space.



Mae Jemison and the other Endeavour astronauts pose for a picture during their mission (above). Jemison's dream of becoming an astronaut came true in 1987 (right).



Mae's dream didn't come true overnight. It happened only after many long years of hard work, training, and preparation. Her success story began nearly thirty-six years earlier, in a small town in Alabama.

Mae Carol Jemison was born on October 17, 1956, in Decatur, Alabama. While she was still a toddler, Mae and her family moved to the big city of Chicago, Illinois. Mae considers Chicago her hometown because she grew up there.

Mae was the youngest child in her family. She had an older brother, Charles, and an older sister, Ada. Her parents, Charlie and Dorothy Jemison, were helpful and supportive of all of Mae's interests. "They put up with all kinds of stuff, like science projects, dance classes, and art lessons," Mae said. "They encouraged me to do it, and they would find the money, time, and energy to help me be involved."

Other adults were not as encouraging as Mae's parents. When Mae told her kindergarten teacher that she wanted to be a scientist, the teacher said, "Don't you mean a nurse?" In those days, very few African-Americans or women were scientists. Many people, like Mae's teacher, couldn't imagine a little black girl growing up to become a scientist. But Mae refused to let other people's limited imaginations stop her from following her dreams.

Mae loved to work on school science projects. She spent many hours at the public library, reading books about science and space. On summer nights, she liked to lie outside, look up at the stars, and dream of traveling in space. Mae was fascinated by the real-life space flights and moon landings that she watched on television. Mae Jemison knew that she wanted to be an astronaut. Although all the astronauts at that time were white and male, Mae wasn't discouraged.

Science and space were not young Mae's only interests. She also loved to dance. Mae started taking lessons in jazz and African dance at the age of nine. By the time she was in high school, Mae was an accomplished dancer, and she frequently performed on stage. She was also skilled at choreography, the art of creating a dance.

In 1973, Mae graduated from Chicago's Morgan Park High School, where she was an honor-roll student and excelled in science and math. That fall, Mae entered Stanford University in California. At Stanford, she specialized in African and Afro-American studies, and chemical engineering. Mae continued her dancing and choreography. She also became involved with student organizations, and she was elected president of the Black Student Union.

After receiving her Bachelor of Science degree from Stanford, Mae enrolled at Cornell University Medical College in New York. She had decided to become a doctor. Medical

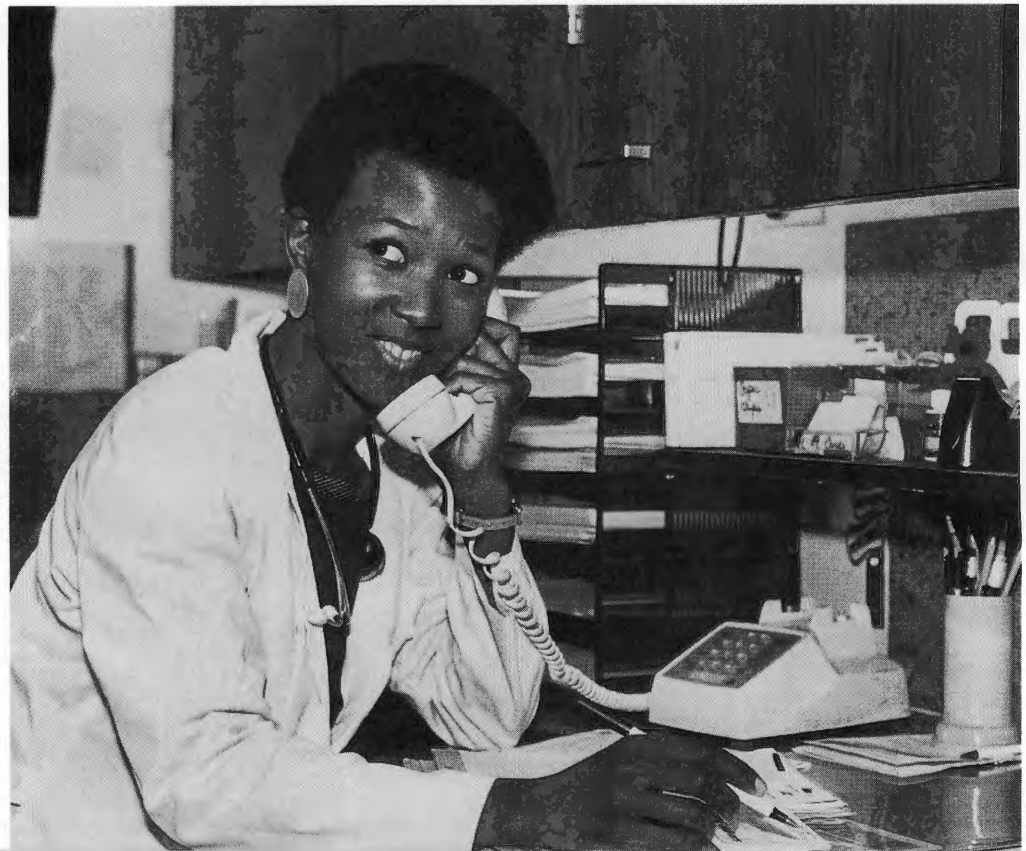
school was demanding, but Mae still found time to participate in student organizations. She served as president of both the Cornell Medical Student Executive Council and the Cornell chapter of the National Student Medical Association.

Mae traveled to several countries as part of her medical training. She studied medicine in Cuba. She helped provide basic medical care for people in rural Kenya and at a Cambodian refugee camp in Thailand.

Mae received her Doctor of Medicine degree from Cornell University in 1981. Like all new doctors, she served an internship, a period of practicing under experienced doctors. Mae completed her internship at the Los Angeles County/University of Southern California Medical Center. Then she started working as a doctor in Los Angeles.

Although she had settled into a career as a doctor, Mae wasn't finished traveling yet. She remembered the trips she had taken during medical school, and she still wanted to help people in other parts of the world. Mae decided to join the Peace Corps, an organization of volunteers who work to improve conditions in developing nations.

Before NASA chose Jemison for the space program, she was working as a doctor in Los Angeles.





*Jemison at the Johnson
Space Center in Houston,
Texas.*

Mae spent more than two years in West Africa. She was the Area Peace Corps Medical Officer for Sierra Leone and Liberia. She was in charge of health care for all Peace Corps volunteers and U.S. embassy employees in those two countries. It was an important responsibility for someone who was only twenty-six years old.

“I learned a lot from that experience,” Mae said. “I was one of the youngest doctors over there, and I had to learn to deal with how people reacted to my age, while asserting myself as a physician.”

When her tour of duty in the Peace Corps was over, Mae returned to Los Angeles and resumed her medical practice. She also started taking advanced engineering classes.

Jemison learns wilderness and water survival skills as part of her NASA training sessions.



Mae had not forgotten her dream of traveling in space. Now that she had the necessary education and experience, Mae decided to try and become an astronaut. She applied to the National Aeronautics and Space Administration (NASA), which is responsible for U.S. space exploration. After undergoing background checks, physical exams, medical tests, and interviews, Dr. Mae Jemison was accepted into the astronaut program in June, 1987. She was one of only fifteen people chosen from nearly two thousand qualified applicants!

Mae didn't let success go to her head. "I'm very aware of the fact that I'm not the first African-American woman who had the skills, the talent, the desire to be an astronaut," she said. "I happen to be the first one that NASA selected."

Mae moved to Houston, Texas, where she began a year of intensive training at NASA's Johnson Space Center. She studied space shuttle equipment and operations. To learn how to handle emergencies and deal with difficult situations, Mae practiced wilderness and water survival skills. Survival training also helps teach cooperation and teamwork. These are important abilities for astronauts who must live and work together for long periods in a cramped space shuttle.

Mae took lessons on how to move her body and operate tools in a weightless environment. On Earth, the force of gravity keeps us from floating off the ground. But in space, there is less gravity, so people and objects drift about. Since there is no “up” or “down” in space, astronauts don’t need to lie down to sleep. They can sleep in any position. To keep from drifting while asleep, they zip themselves into special sleeping bags attached to the shuttle’s walls.

During training, Mae got a preview of weightlessness. She flew in a special training jet that simulates zero gravity. The jet climbs nearly straight up, then loops into a steep dive. This is similar to the loop-the-loops on many roller coasters. For thirty seconds at the top of the loop, trainees feel weightless. Their feet leave the floor and they can fly around inside the padded cabin.

At the end of her training year, Mae officially became a mission specialist astronaut. “We’re the ones people often call the scientist astronauts,” Mae explained. “Our responsibilities are to be familiar with the shuttle and how it operates, to do the experiments once you get into orbit, to help launch the payloads or satellites, and also do extravehicular activities, which are the space walks.”



Jemison and astronaut Jan Davis experience weightlessness in NASA’s zero-gravity training jet.

In the 1970s, NASA designed the space shuttle as the first reusable spacecraft. A shuttle launches like a rocket, but it returns to Earth and lands on a runway like an airplane. A space shuttle has many uses. It carries both equipment and people into space. Astronauts aboard a shuttle can capture, repair, and launch satellites. Shuttles are often used as orbiting laboratories, where space scientists conduct experiments in a zero-gravity environment. In the future, space shuttles might transport supplies and workers for building space stations.

Although Mae was a full-fledged astronaut, she still had to wait four more years before she went into space. While she waited, Mae worked with the scientists who were developing experiments for her mission. She also trained with her fellow crew members. In her spare time, Mae liked to read, travel, ski, garden, dance, and exercise. She also enjoyed taking care of Sneeze, her white, gray, and silver African wildcat.

On September 12, 1992, the long wait was over. Space shuttle *Endeavour* perched on the launch pad like a great white bird waiting to take flight. Everything was ready for the liftoff.

Mae awoke early to shower and dress. She ate breakfast with the other astronauts. Then, Mae and the crew put on their orange space suits and boarded a van for the short drive to the launch pad. For two-and-a-half hours until liftoff, they lay on their backs, strapped into their seats, as the countdown progressed. At 10:23 A.M., precisely on time, *Endeavour* lifted off on its historic space journey.

Dr. Mae Jemison earned her place in the history books as the first African-American woman in space. Mae said, "My participation in the space shuttle mission helps to say that all peoples of the world have astronomers, physicists, and explorers."

Endeavour's mission was devoted to scientific research. Mae was responsible for several key experiments. She had



The crew of the Endeavour heads toward the launch pad (left). The illustration (below) shows the space shuttle in flight. Spacelab, the laboratory where the experiments are conducted, is located near the front of the shuttle.



helped design an experiment to study the loss of bone cells in space. Astronauts lose bone cells in weightlessness, and the longer they stay in space, the more they lose. If too many cells are lost, bones become weak and can break easily. Scientists hope to find a way to prevent this loss. Mae explained, "The real issue is how to keep people healthy while they're in space."

Mae investigated a new way of controlling space motion sickness. Half of all astronauts experience space sickness during their first few days in space. They often feel dizzy and nauseated. Astronauts can take medicine to control space sickness, but the medicine can make them tired.



(Above) Jemison and Jan Davis work on a zero-gravity experiment.

(Right) Jemison wears special equipment for the biofeedback experiment.



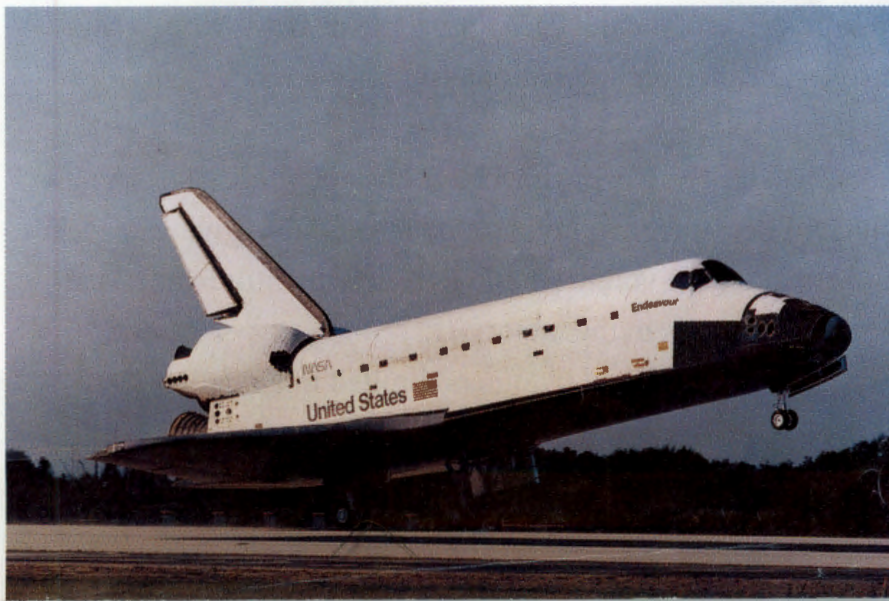
To carry out the space-sickness experiment, Mae had been trained in the use of “biofeedback” techniques. Biofeedback uses meditation and relaxation to control the body’s functions. Mae wore special monitoring equipment to record her heart rate, breathing, temperature, and other body functions. If she started to feel ill, she would meditate. She concentrated intensely on bringing her body back to normal. The purpose of the experiment was to see if Mae could avoid space sickness without taking medication. The results of the experiment were not conclusive, but space researchers still hope to use biofeedback in the future.

Mae was also in charge of the frog experiment. Early in the flight, she fertilized eggs from female South African frogs. A few days later, tadpoles hatched. She then watched the tadpoles carefully. Her goal was to find out if the tadpoles would develop normally in the near-zero gravity of space. "What we've seen is that the eggs were fertilized and the tadpoles looked pretty good," said Mae. "It was exciting because that's a question that we didn't have any information on before."

On September 20, 1992, at 8:53 A.M., *Endeavour* landed at Kennedy Space Center. The crew had spent more than 190 hours (almost eight days) in space. They had traveled 3.3 million miles and had completed 127 orbits of Earth!

After her space mission, Mae returned home to Chicago. Her hometown welcomed her with six days of parades, speeches, and celebrations. Then she went to Hollywood to accept the American Black Achievement Awards' Trailblazer Award for being the first African-American woman in space. In 1993, Mae was inducted into the National Women's Hall of Fame in Seneca Falls, New York.

Mae Jemison had made her childhood dream come true. She was ready for new challenges. A few months after her space flight, Mae took a leave of absence from NASA to teach and to do research at Dartmouth College in New Hampshire. Then, on March 8, 1993, she permanently resigned from the astronaut corps.



The Endeavour touches down at the Kennedy Space Center.

Jemison congratulates Jill Giovanelli, age thirteen, winner of the International Peace Poster Contest.



Mae formed her own company called The Jemison Group, Inc. The Jemison Group's goal is to develop ways of using science and technology to improve the quality of life. Mae's company makes a special effort to improve conditions in poor and developing countries.

The company's first project used satellite communications to provide better health care for people in West Africa. Mae also established an international summer science camp for young people.

Besides her work with The Jemison Group, Mae spends much of her time traveling around the country, giving speeches, and encouraging young people to follow their dreams. Mae Jemison believes in the motto:

“Don't be limited by others' limited imaginations.”

Meet the Author



Gail Sakurai first decided to become a writer as a child. She had hoped to have her first book published by the time she was a teenager, but her plan did not quite work out. Sakurai says, “My childhood dream came true with the publication of my first book in 1994 — only twenty-nine years later than originally planned.”

Her first book, *Peach Boy: A Japanese Legend*, is a retelling of a Japanese folktale that her husband used to tell to their sons at bedtime. She has continued to write nonfiction books and retellings of folktales.

She says that the two most difficult parts of her job are having enough time to write and starting. Once she does begin, she writes quickly because she has already planned the words in her mind.

Sakurai has written several other books for young people, including *The Liberty Bell*, *Stephen Hawking*, *Paul Revere’s Ride*, and *The Jamestown Colony*.

Internet



If you would like to read more about Gail Sakurai, visit Education Place. www.eduplace.com/kids

Responding

MAE JEMISON
Space Scientist



By Gill Soboroff

Think About the Selection

1. What obstacles did Mae Jemison have to overcome to achieve success in her life?
2. How did Mae show that she had many talents even before she graduated from high school? Use examples from the selection to support your answer.
3. What do Mae's career changes tell you about her?
4. Think about the Jemison Group's goals. In what way do these goals represent a mix of Mae's talents and lifelong interests?
5. Since childhood Mae dreamed of traveling in space. What are some of your dreams for the future?
6. Which one of Mae's accomplishments impressed you most? Why?
7. **Connecting/Comparing** Why do you think the stories of Mae Jemison, Michelle Kwan, Doug Grillo, and Manuel Gomez all belong in a theme titled *Give It All You've Got*? What qualities do they share?



Informing

Write an Interview Script

Write the script that you would use if you could interview Mae Jemison. What questions might you ask her about her life and work?

Tips

- Brainstorm what you're most interested in finding out about Mae Jemison.
- Use the correct end marks for statements and questions.

Science

Create a Fact Sheet

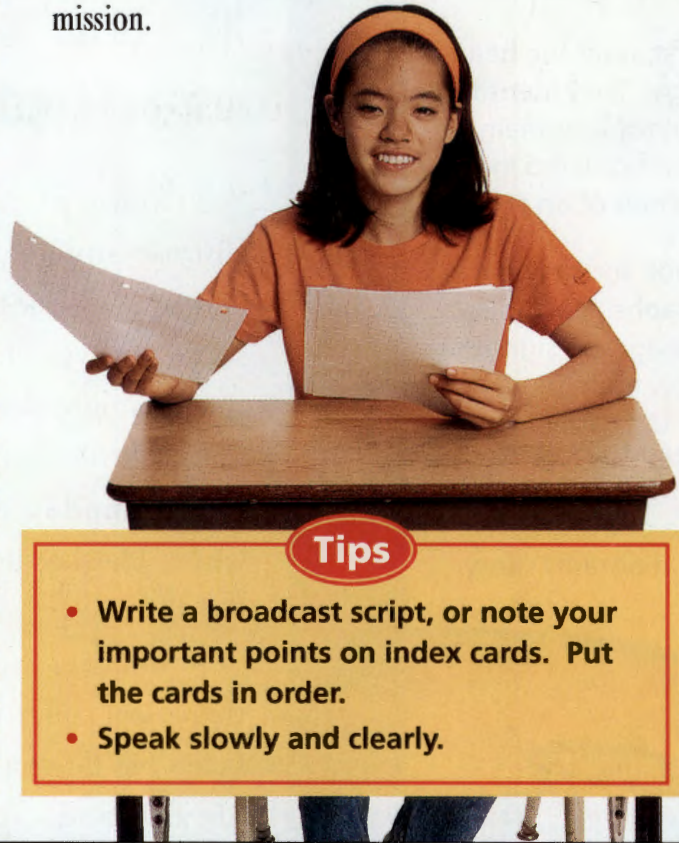
With a partner, create a fact sheet about what it is like to travel in the space shuttle. Include information about how to train for a space mission. Use information from the selection and from other sources. You might use the fact sheet to give an oral presentation.



Listening and Speaking

Present a TV Broadcast

Mae Jemison made a live TV broadcast from *Endeavour*. Present your own version of this broadcast. Tell viewers all about *Endeavour's* mission.



Tips

- Write a broadcast script, or note your important points on index cards. Put the cards in order.
- Speak slowly and clearly.

Internet

Complete a Web Word Find

You've learned a lot of vocabulary related to space missions in this selection. Try finding those words in a puzzle that can be printed from Education Place.

www.eduplace.com/kids

Science Link

Skill: How to Use Text Organization

Headings, paragraphs, and captions can help you see how the information in a nonfiction article is organized.

- 1 First, read the **headings**. They identify the topic or main point covered in each section of an article.
- 2 Look for new **paragraphs**. Each new paragraph signals a new main idea.
- 3 Read the **captions** to find out what the photographs or diagrams show.

California Standards

Standards to Achieve

Reading

- **Understand text features (R2.1)**
- **Use order to analyze text (R2.2)**

Science

- **Water covers most of Earth (S3.a)**

Into the Deep



Explorers in new underwater vehicles hope to unlock the secrets of the oceans' depths.

Sea explorer Graham Hawkes is ready to take a historic plunge. In the next few months, he will venture deep into the Pacific Ocean in an awesome new vessel. Most ocean-exploring vehicles drop straight down through the water. Some creep slowly along the ocean floor gathering samples and information. But *Deep Flight I*, which Hawkes helped design, zips around like a fighter plane.

Steering with joysticks, Hawkes can make the vessel roll, turn, dive and shoot for the surface. He'll get a close-up view of the wondrous life and landscape of the dark, silent world under the sea. "These vehicles are so small and light, you can send them anywhere," says Hawkes.

For years people have said the last unexplored frontier is outer space. But we really don't have to leave our planet to boldly go where no one has gone before. About 75 percent of the earth's surface is covered by the sea, and we haven't come close to seeing it all. "We know more about Mars than we do about the ocean," says Sylvia Earle, a marine biologist who helped create *Deep Flight I*.



DEEP FLIGHT I

Able to dive to 3,300 ft.
14 ft. long

What's Down There?

With *Deep Flight I* and a fleet of other new vessels and robot craft, explorers hope to discover all sorts of riches in the sea. Among these riches are unusual living creatures. Some may prove useful as sources of medicine, food and chemicals.

- The deep ocean is home to some of earth's oddest creatures. The anglerfish, the gulper eel and other deep dwellers have crushproof bodies that allow them to survive the ocean pressures 5,000 feet down. Some have body parts that can glow in the dark to attract prey.

- At even greater depths, researchers have found bizarre eight-inch-long tube worms, and clams that are the size of dinner plates. They live in the boiling-hot waters near ocean vents. The vents are cracks where seawater seeps into the earth's crust and then shoots back up like a geyser. With temperatures reaching 750°F, it's amazing that anything lives nearby!

-The vents constantly spew out valuable minerals like iron, copper, nickel, cobalt and manganese. The material hardens into chimneys known as "black smokers." (One of the biggest is nicknamed Godzilla.) Parts of the Pacific sea floor are littered with potato-size nuggets of these minerals. Mining companies are eager to scoop them up.

The Very, Very Bottom

The ocean floor is not flat. Valleys, canyons, mountains and even volcanoes shape the underwater world. The deepest known point is the Mariana Trench near the Pacific island of Guam. In 1960 two scientists in a research vessel traveled 35,800 feet down — about seven miles — to explore it. A Japanese vessel went nearly that deep again last year.

Japan has a good reason to explore the ocean bottom. Southern Japan sits on a shaky part of the sea floor where three pieces of the earth's crust meet. Those pieces, called tectonic plates, shift slightly each year. The shifting can trigger earthquakes like the one that killed 5,500 people in Kobe, Japan, in 1995. Scientists say studying the plates may help them predict earthquakes.

A Costly Quest

It costs millions of dollars to explore the deep sea. Not everyone agrees on how to do it. Some explorers say we should focus on the part of the ocean that is 20,000 feet deep or less. That's about 97 percent of the ocean. Exploring the deepest 3 percent requires more expensive equipment and is more dangerous.

— But other scientists say exploring the very deepest part of the ocean will be worth the risk and cost. Greg Stone, a marine biologist in Boston, Massachusetts, says we can count on finding new animals and other discoveries we can't even imagine. "We won't know what it holds until we've been there," he says.



Creatures of the Deep

1 Hatchet Fish
1,000 ft.–5,000 ft.
Up to 5 in. long

2 Snipe Eel
2,000 ft.–6,600 ft.
Up to 5 ft. long

3 Deep-sea Shrimp
6,600 ft.–9,900 ft.
Up to 6 in. long

4 Fangtooth
2,600 ft.–5,000 ft.
Up to 10 in. long

5 Cranchid Squid
1,600 ft.–6,600 ft.
8 in. long

6 Gulper Eel
2,000 ft.–6,600 ft.
Up to 5 ft. long

4

5

6

Filling in the Blank

Some test items ask you to complete a sentence. You do this by selecting the best answer from three to five answer choices. How do you choose the best answer? Look at this sample test item for *Mae Jemison: Space Scientist*. The correct answer is shown. Use the tips to help you answer this kind of test question.

Tips

- Read the directions carefully. Make sure you know how to mark your answers.
- Read the sentence with each answer choice.
- Look back at the selection if you need help with your answers.
- Go back and check all your answers if you have time.

Read the sentence. Fill in the circle in the answer row for the answer that best completes the sentence.

- 1 The main idea in the first three paragraphs of the selection is —
- A Mae Jemison felt happy and excited to be in space.
 - B The space shuttle *Endeavour* was launched into space and soon was orbiting Earth.
 - C Mae Jemison made history as the first African American woman in space.
 - D The date was September 12, 1992.

ANSWER ROW 1 (A) (B) ● (D)

Now see how one student figured out the best answer.

I turn back to the first page of the selection. I look for important ideas. I decide that the most important idea is that Mae Jemison was the first African American woman in space.

I read the answer choices again. **A** and **D** don't work because they are details rather than the main idea. **B** is an important idea, but **C** is the most important idea in all the paragraphs. So **C** is the best answer.

