

ON THE SPACE STATION

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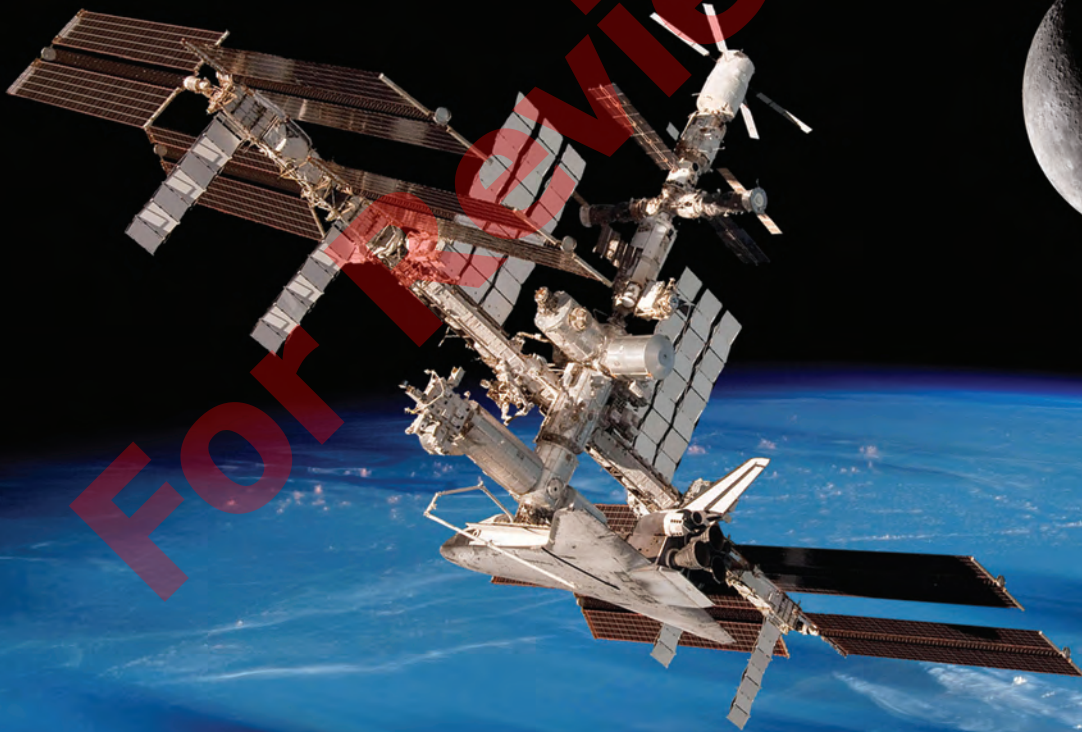
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SPACE STATION ASTRONAUTS:

A DAY IN THE LIFE

American astronaut Greg Chamitoff knows what it's like to live in space. He lived on the International Space Station (ISS) for 198 days. He describes his experience as a “blur of new sensations, out-of-this-world experiences, and hard work.”

The ISS is a man-made satellite, or space structure, that orbits, or revolves around, Earth. According to the National Aeronautics and Space Administration (NASA), the ISS is the largest space structure ever built by humans.



The International Space Station

The ISS is a research station and laboratory that gives scientists from around the world the opportunity to conduct research on many topics. It helps scientists better understand what it takes to live in space. It also helps scientists discover new things about living on Earth.

The ISS is a remarkable technological achievement. But it's also a remarkable collaboration, or cooperative effort, between nations. The ISS is a joint partnership among 5 international space agencies representing 15 countries around the world, including the United States, Russia, and Japan.

In 1998, Russia launched the first module, or part, of the ISS into space. Two years later, the first team of one American astronaut and two Russian

cosmonauts (Russian astronauts) arrived to live on the ISS. They stayed on the ISS for 136 days.

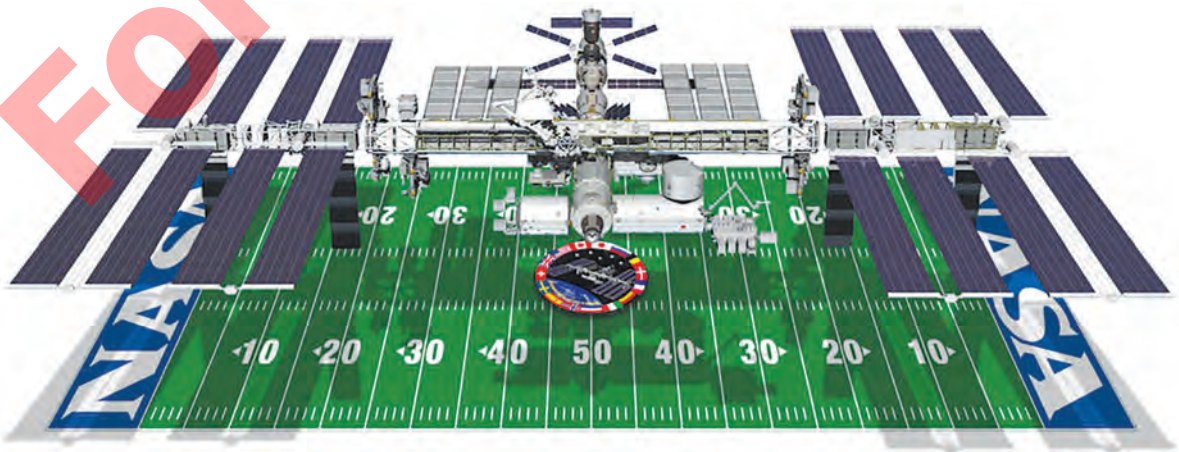
Since then, the ISS has always been occupied. More than 240 people from over 19 different countries have lived on the ISS.

As NASA says, the ISS demonstrates “what is achievable when nations work together toward common goals that improve life everywhere.”

ISS by the Numbers

There are a lot of numbers related to the ISS. Here are three of them from NASA.

- **400 kilometers (248 miles):** the average height above Earth at which the ISS orbits
- **8 kilometers (5 miles) per second:** the speed at which the ISS travels
- **419,573 kilograms (925,000 pounds):** how much the ISS weighs—about the same as 320 cars



▲ The ISS is about 109 meters (357.5 feet) long—a little longer than an American football field.

In Orbit

Although the ISS is very heavy, it doesn't fall from space back to Earth. It doesn't fly off into deep space, either. Gravity helps keep it in orbit.

The scientist Sir Isaac Newton “discovered” gravity more than 300 years ago. He came up with a theory, or scientific idea, about motion. He said that a moving object, like a ball—or like the ISS—will continue in a straight line unless a “force” acts on it.

Imagine throwing a ball in a straight line. No matter how high or hard the ball is thrown, it eventually falls to Earth. In other words, some force has “acted on” the ball and caused it to fall to Earth. Newton called that force gravity.



▲ This player knows that, thanks to gravity, the ball will eventually come down so she can catch it.

Newton's discovery of gravity has helped scientists today put the ISS and other space satellites into orbit around Earth. Gravity is what keeps the ISS from flying off into space.

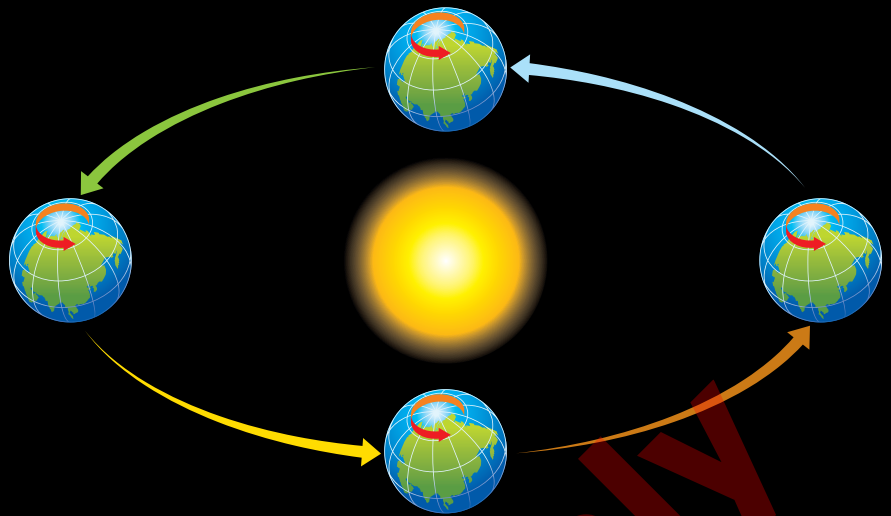
Gravity pulls the ISS toward Earth, but not all the way down to Earth. That's because of the space station's momentum, or force of motion. The ISS travels very, very fast (8 kilometers (5 miles) per second), and that momentum balances the pull of gravity. Gravity is pulling the ISS toward Earth, but the space station's speed keeps it in orbit. If the ISS slowed down, gravity would eventually pull it to Earth.

Distances in Space

One of the interesting things about the International Space Station is that it can be seen from Earth without a telescope. The ISS is the second-brightest object in the night sky—second only to the moon and brighter than Venus. That makes the ISS easy to see. According to NASA, it looks like a fast-moving plane in the sky.

There is one big difference. A commercial airliner flies at an average altitude of 9.6 kilometers (6 miles). The space station travels at an average altitude of 400 kilometers (248 miles).

Earth orbits the sun, which is its closest star. Earth's orbit is elliptical, but the average distance between Earth and the sun is almost 150 million kilometers (93 million miles). Earth's momentum keeps it from being sucked in by the sun's gravity.

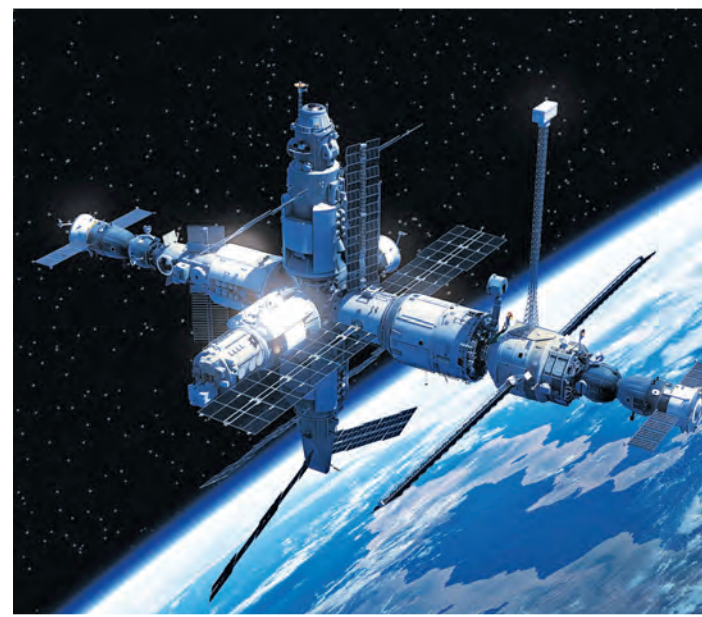


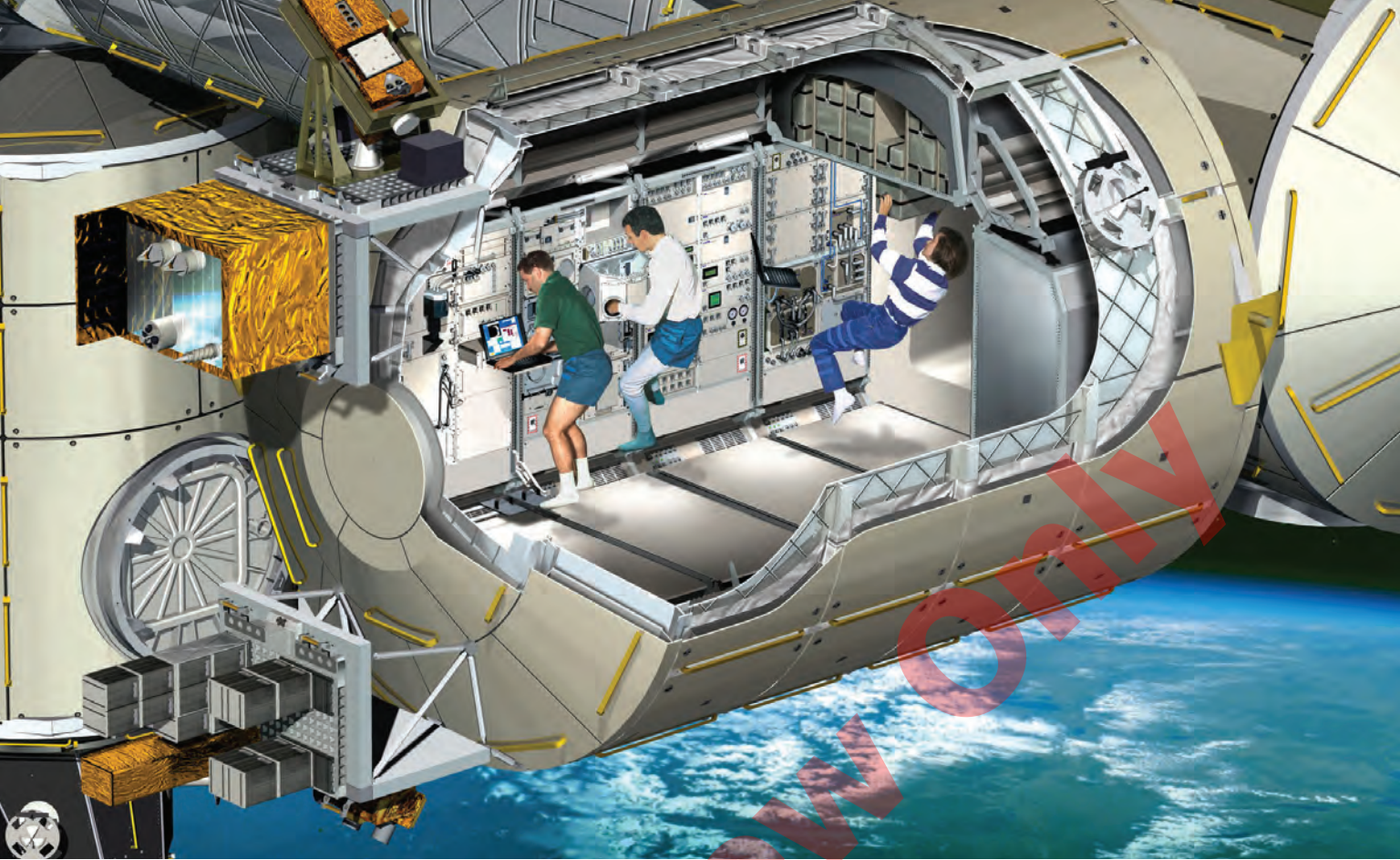
Both the ISS and the moon are satellites of Earth, which means they orbit Earth. Earth's satellites are sometimes closer to Earth and sometimes farther away. The distance varies because their orbits are not circular but elliptical. (An ellipse is like an oval.)

For example, the average distance from Earth to the moon is about 384,400 kilometers (238,900 miles). However, when the moon is closest to Earth, the distance is around 363,000 kilometers (225,600 miles). And when it's the farthest away, the distance is around 405,600 kilometers (252,000 miles). That's a difference of over 42,000 kilometers (26,000 miles), close to the circumference of Earth.

Spot the ISS

Several times a week, Mission Control at NASA's Johnson Space Center in Houston, TX, determines when the International Space Station can be seen in more than 6,700 locations around the world. To look up viewing times for the ISS from any location on Earth, go to "Spot the Station" on NASA's website.





An ISS Astronaut's Daily Routine

An astronaut living on the ISS has a hard job. The job involves being a scientist, a construction worker, a housekeeper, a doctor, and a pilot—all rolled into one. Astronauts have to be prepared to perform all kinds of tasks.

One of the main jobs for ISS astronauts is conducting experiments. Many of the experiments are designed to answer questions about how the human body adjusts to living in space.

For example, in the early days of the space station, scientists discovered that many astronauts experienced motion sickness during their mission. Research helped scientists develop

▲ A lot of interesting research goes on in the ISS.

new techniques for astronauts who suffer from motion sickness.

Astronauts on the ISS also collect data about Earth's environment. According to NASA, "The space station significantly improves our ability to monitor the Earth and respond to natural hazards and catastrophes." For instance, photos taken from the ISS of the active Italian volcano Mount Etna help scientists to monitor it.

One of the most difficult and dangerous jobs on the ISS involves Extravehicular Activity (EVA)—otherwise known as a spacewalk.

Astronauts have to leave the interior of the ISS for different reasons. Sometimes they need to make repairs to the station. On an EVA, astronauts often work up to 7 hours in space. They wear special suits that protect them and provide life support functions.

Finally, there's the job of just keeping the ISS clean. That's a very important part of the daily routine. As the Canadian Space Agency (CSA) points out, "Floating debris like crumbs and hair could get lodged into control panels and cause damage."

A 24-Hour Day on the ISS

Mission Control sets a daily work schedule for each crew member. This chart shows a typical day on the ISS as planned by the Canadian Space Agency.

Activity	Time	Tasks	
Post-sleep	1.5 hours	• Morning hygiene • Morning meal	• Morning station inspection
Planning and coordination	30 minutes	• Daily planning meeting	• Daily status report
Exercise	2.5 hours	• Cardiovascular exercise or strengthening exercises	• Equipment setup and stowage
Midday meal	1 hour		
Daily systems operations	1.5 hours	• Work preparation (current day) • Report preparation	• Review plan for next day • Trash collection • E-mail review
Work	6.5 hours	• Assembly • Maintenance • Traffic operations	• Medical operations • Onboard training • Utilization operations
Pre-sleep	2 hours	• Evening meals • Relaxation	• Evening hygiene
Sleep	8.5 hours		