

# VR PAVILION 2024 : DOSSIER PEDAGOGIQUE (EN)

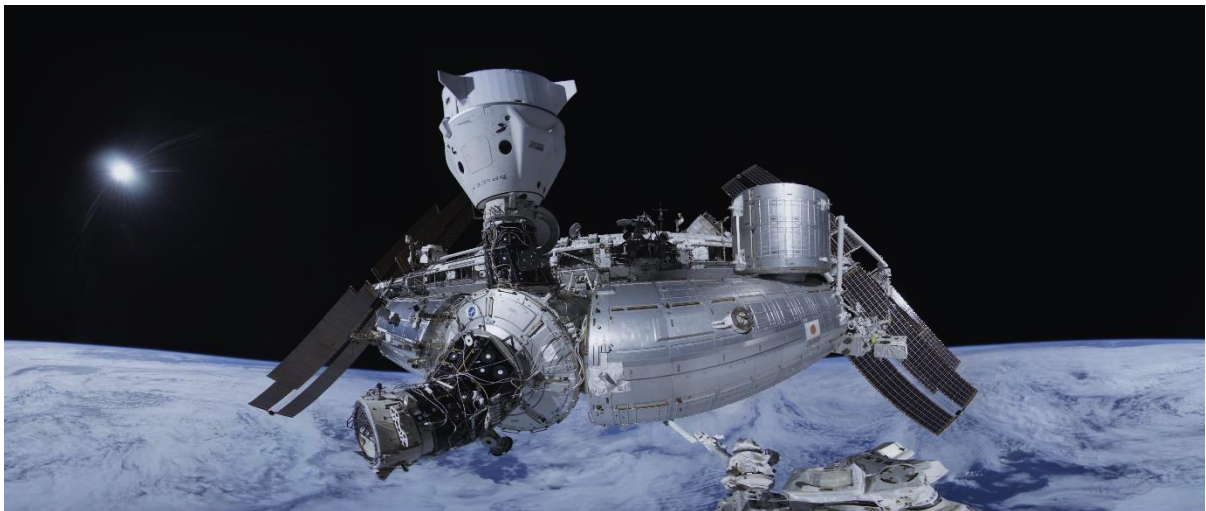
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**SPACE EXPLORERS: SPACEWALKERS** by Felix & Paul Studios in association with Time Magazine

Educational Toolkit

Witness the world's first-ever spacewalk captured in cinematic VR outside the International Space Station.

Prepared for Film Fund Luxembourg by PHI Studio.



Welcome to the breath-taking world of spacewalks! Imagine floating in space, surrounded by stars, wearing a special suit that keeps you safe. That's what astronauts do during spacewalks outside the International Space Station (ISS). These brave explorers venture into the vastness of space to fix things, conduct experiments, and build incredible structures.

## SPACEWALK ADVENTURES



Imagine floating effortlessly like an astronaut on a spacewalk!

Picture yourself floating in outer space, surrounded by twinkling stars, clad in a specialized suit ensuring your safety. Astronauts embark on thrilling journeys outside the International Space Station (ISS) during spacewalks. These daring missions repairing equipment, conducting experiments, and constructing extraordinary structures while floating in the great expanse of space.



Spacewalks are endurance tests lasting for hours, requiring astronauts to perform precise tasks in the challenging microgravity environment.

Astronauts meticulously plan each move during a spacewalk to guarantee their safety and accomplish their mission objectives.

### Vocabulary:

- Extravehicular Activity (EVA)
- Microgravity
- Precision Maneuvers

## LIFE IN SPACE

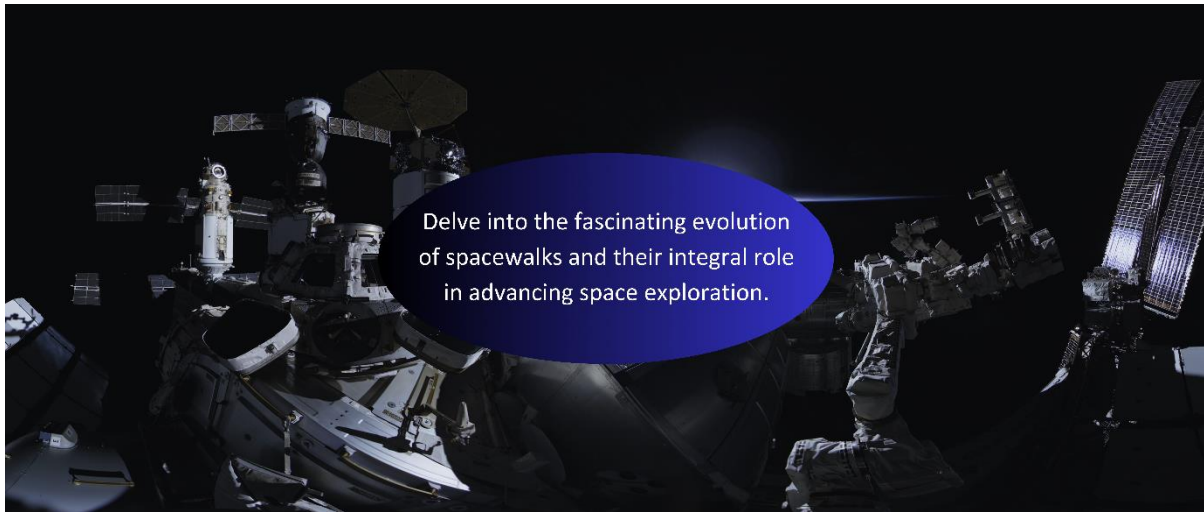


The International Space Station (ISS) isn't just a space station—it's a gigantic floating home for astronauts, stretching as large as a football field! Imagine living in space, surrounded by friends from different countries. Life aboard the ISS is bustling with activity. Astronauts and cosmonauts inhabit a sophisticated living space, orbiting our planet while conducting experiments, maintaining the station, and even gearing up for future missions to Mars. In their free time, astronauts do a lot of things similar to what we do on Earth, like relaxing, cleaning and talking to friends and family.



The ISS completes a full rotation around Earth every 90 minutes, giving astronauts and cosmonauts a breath-taking view of 16 sunrises and sunsets every day! Aboard the ISS, the toilets and showers have to suck everything up through small holes, and there's no flushing! Astronauts sleep in any direction with no bed, just a sleeping bag strapped to a wall so they don't float around.

## HISTORY OF SPACEWALKS - Building the Space Station



Going outside the spacecraft is called an extravehicular activity (EVA) or a spacewalk. During the Apollo missions (1969–1972), 12 astronauts carried out EVAs on the moon’s surface to make observations, test equipment, and perform science experiments. Between 1998 and 2011, astronauts from several countries performed 155 EVAs to assemble the International Space Station (ISS) piece by piece. Their remarkable efforts were essential in piecing together this colossal structure, linking modules, and installing vital equipment that supports life and scientific research in space.

These days, most EVAs are to repair, maintain, and upgrade parts of the ISS. Astronauts have only six to seven hours of life support during an EVA, so they must work quickly without sacrificing safety.



Spacewalks were pivotal in constructing the ISS, allowing astronauts to connect modules and install crucial equipment for life support and scientific experiments. These Extra-Vehicular Activities (EVAs) weren't just to assemble the ISS. Astronauts perform spacewalks for many reasons, like repairing and enhancing the Hubble Space Telescope through shuttle-based spacewalks.

### Vocabulary:

- Extra-vehicular activity (EVA)
- Ingenuity
- Module integration

## GETTING READY FOR A SPACEWALK



Astronauts don't just float into space—they prepare extensively for their spacewalks. Before they venture outside the safety of the International Space Station (ISS), they undergo rigorous training right here on Earth. This training takes place in a giant swimming pool called the Neutral Buoyancy Laboratory (NBL) that simulates the weightlessness of space. Here, astronauts gear up in specialized suits designed to mimic the ones used in space. They immerse themselves in an environment similar to the challenges of working in a vacuum, practicing necessary manoeuvres and tasks vital for their space missions.



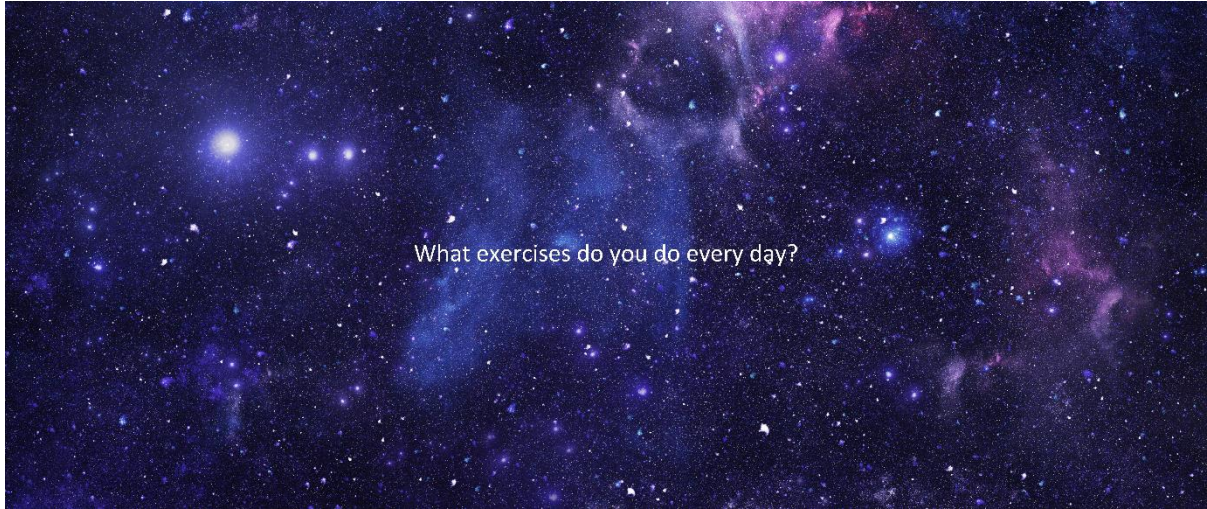
The NBL, a colossal pool measuring 202 feet (81.56 meters) long, 102 feet (31.08 meters) wide, and 40 feet (12.19 meters) deep, holds 6.2 million gallons of water and hosts full-scale mock-ups of ISS components. For every hour spent spacewalking, astronauts train for around seven hours in the pool, perfecting their techniques and acclimating to the constraints of their suits.

### Vocabulary:

- Neutral Buoyancy Laboratory (NBL)
- Vacuum
- Simulations



## SPACE'S IMPACT ON THE HUMAN BODY



Have you ever wondered how space influences the human body? It's fascinating! When astronauts journey into space, they experience surprising bodily changes.

Being in space affects astronauts' bodies, with visible effects starting within the first 10 minutes! On Earth, gravity causes most of the body's fluids to be distributed below the heart. However, space has less gravity, which makes fluids spread equally throughout the body. Because of this, their faces puff up, and their legs appear slender. Before going to space, astronauts go through many simulations to experience what a lack of gravity does to their bodies.

On Earth, simulation in low gravity is done underwater in a giant swimming pool. This simulation is called neutral buoyancy. While in space, astronauts perform rigorous exercise routines crucial for maintaining muscle and bone strength in space. Within a few days of returning to Earth, astronauts' circulation returns to normal.



Astronauts exercise for at least 2 hours daily to counteract muscle and bone weakening in space.

**ASTRO, COSMO, SPATIO, TAIKO...?**

The United States chose "*astronaut*" from the Greek ástron (star) and nautes (navigator).

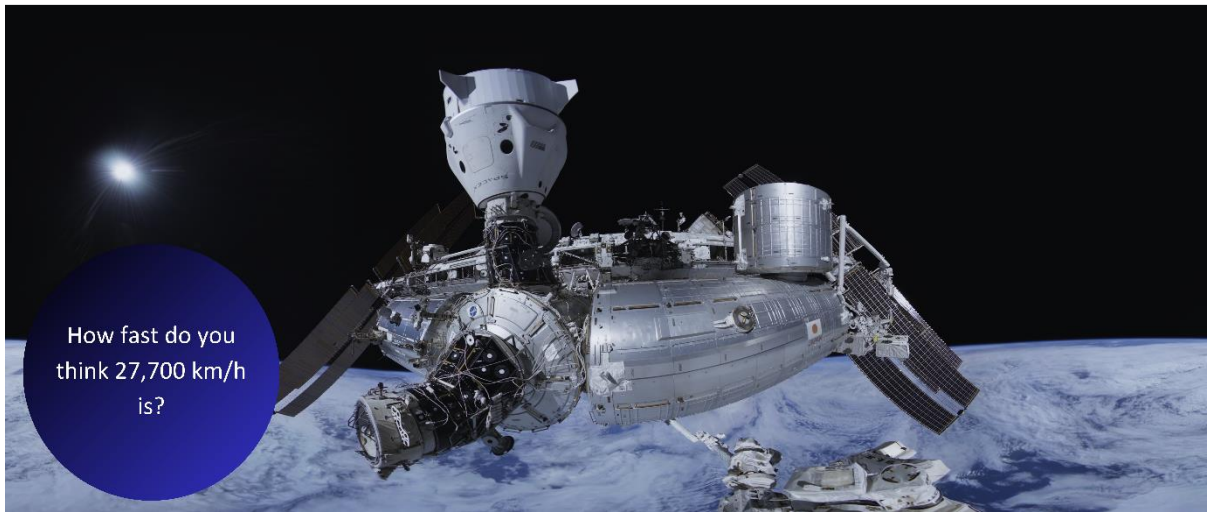
"*Cosmonaut*," translated from Russian космонавт, or kosmonavt, has its roots in Greek, from kosmos (universe) and nautes (navigator).

France and the European Space Agency (ESA) prefer the term "*spationaut*," a hybrid word from the Latin spatium (space) and the Greek nautes (navigator).

The term "*taikonaut*" (from the Chinese word tàikōngrén, tàikōng designating space, and rén man) is used to describe travellers sent with Chinese launchers.

India uses the term "*vyomanaut*," which comes from the Sanskrit vyoman (sky) and the Greek nautes.

## THE WONDERS OF THE ISS



The International Space Station (ISS) is a monumental feat in human exploration—it's the largest object ever flown in space! Travelling at a remarkable average speed of 27,700 km/h, the ISS completes an astonishing 16 orbits around Earth daily. As it glides 320 kilometres above us, it becomes visible from Earth at night, presenting a breathtaking spectacle. Collaboration from 16 countries, including the USA, Russia, Japan, Canada, and ESA member states, brought this colossal station to life.



The ISS has 16 enormous solar panels connected to its central truss, supporting the essential living and working modules. Did you see them when you were on your spacewalk? The Station's electrical systems have about 13 kilometres (8 miles) of wiring!

A staggering collaboration involving over 100,000 people worldwide brought the ISS to life, highlighting the collective effort and expertise behind this extraordinary space habitat. The ISS orbits the Earth at a speed that allows it to cover the distance to the moon and back in a single day.



## EXPLORING VIRTUAL REALITY

Have you ever been curious about the mesmerizing world of Virtual Reality (VR)? It's like strapping on magical glasses that transport you to breath-taking adventures! VR operates through a headset displaying two different images—one for each eye—that your brain fuses into a 3D wonderland using stereo imagery or stereoscopy. VR immerses us in digitally crafted realities, blurring the lines between the real and the imagined.

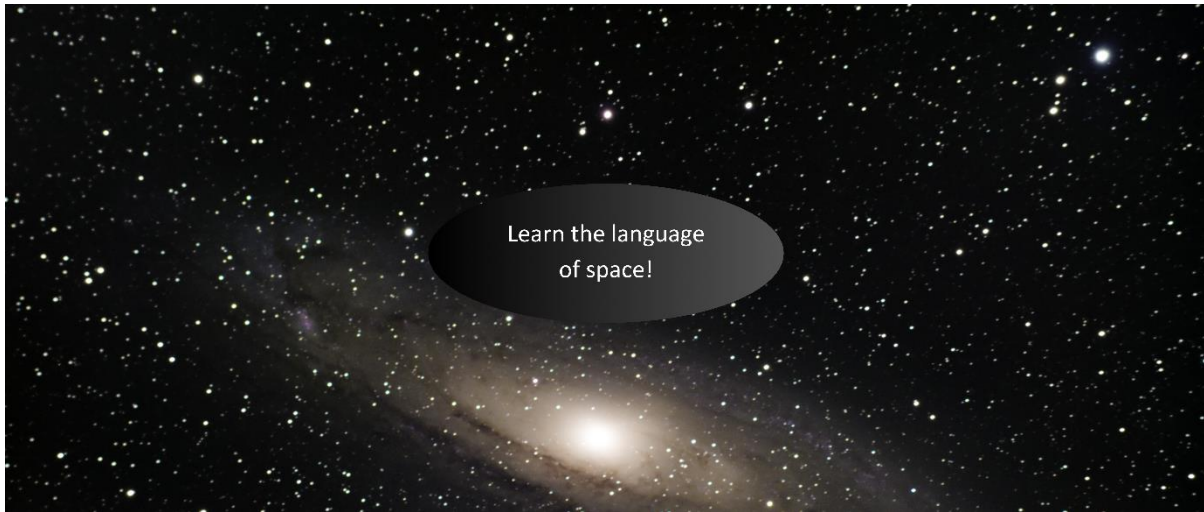


VR's roots trace back to Ivan E. Sutherland's visionary concept of the 'Ultimate Display' in 1968. Daniel Vickers crafted the very first VR headset at the University of Utah in the 1970s. Even before VR, Morton Hellig's Sensorama machine in 1956 offered people early glimpses of stereoscopic images and sensory experiences (it even had smells!).

### Vocabulary:

- Virtual Reality
- Stereo Imagery
- Sensorama

## SPACE STATION VOCABULARY



*Welcome to the language of space! Here are some words that Astronauts use on the space station:*

**AIRLOCK** - The special module astronauts use to enter and leave the Space Station for spacewalks.

**ASTRONAUT** - The American word for space traveller

**CANADA ARM** - Canada's giant robotic arm, called 'Canadarm2' for short (the first Canadarm flew on the Shuttle)

**COLUMBUS** - Name given to Europe's laboratory module in honor of Christopher Columbus

**CYGNUS** - An American spaceship designed to bring supplies to the Space Station

**COSMONAUT** - The Russian word for space traveller

**DESTINY** - Name given to America's laboratory module, which also controls most of the Station's functions

**DRAGON** - The first American spaceship to visit the Station since the Space Shuttle was retired; designed to bring people and supplies

**KIBO** - Name given to Japan's laboratory module, it means 'hope' in Japanese

**MODULE** - Any of several special 'rooms' on the Station where people can live and work without having to wear a space suit

**NASA** - The short form of 'National Aeronautics and Space Administration' (America's space agency)

**PROGRESS** - Name given to the Russian spaceship that brings supplies and fuel to the Space Station

**RADIATOR** - Special parts designed to unfold and release heat into the coldness of space so the Station doesn't overheat

**RESEARCH** - Collecting data and figuring out what it means as a way of trying to understand better how things work

**SCIENCE** - Observing, studying, and experimenting to learn about how the universe and everything in it works

**SOLAR ARRAY** - Special parts that unfold and are designed to use the sun's energy to make electricity to power the Station

**SOYUZ** - Russian for 'union'; it is the name of Russia's spaceship that carries people to the Station and back again

**SPACE SHUTTLE** - American spaceship, now retired, used to launch most of the Station's pieces, plus people and supplies

**TRUSS** - The giant beam which connects the solar arrays and radiators to the rest of the Space Station

**ZVEZDA** - Russian for 'star'; a name given to the module that controls the Russian part of the Space Station

Further Questions



1. How did you feel in your body? Light? Small? Lost?
2. How does this experience make you feel about the planet?
3. What kinds of things did they talk about over the radio?
4. How many rooms does the ISS have?
5. How do you think it feels to sleep in the weightlessness of space?
6. How many people do you think have walked in space?
7. Express your sensations and things you saw.