SPACE

AN OUT-OF-GRAVITY EXPERIENCE

EXHIBITION OVERVIEW

Science Museum of Minnesota®

smm.org/travelingexhibits

Space invites visitors to explore the journey humans are taking into space and imagine a future when Earth is no longer the only planet we call home.

What is it like to travel to, live and work in space?
What makes it so challenging?

This hands-on exhibit explores the challenges and solutions that will shape our future in space.

A Hands-On Touring Exhibition:

10,000-12,000 sq. ft. / 14' height minimum
12-week & 24-week rental periods available
Bilingual - English & Spanish

Target Audience:

Kindergarten through Adult

Highlighted Curriculum Topics:

Defining and Delimiting an Engineering Problem
Developing Possible Solutions
Optimizing the Design Solution
Forces and Motion, especially ***gravity***
Energy

Based on the Next Generation Science Standards

Section 1: Space can kill you

Space is not a friendly place. The environment just beyond our atmosphere can be deadly. If the extreme temperatures don't get you, the radiation will. Your spacecraft can protect you from the vacuum, but watch out for the meteoroids. Here visitors will explore the dangers of space and some of the protections that engineers have devised for astronauts.

Section 1: Space can kill you

Interactive & Multimedia Experiences

Interactive touch graphics

Interview video about the dangers of space

Vacuum bell jar

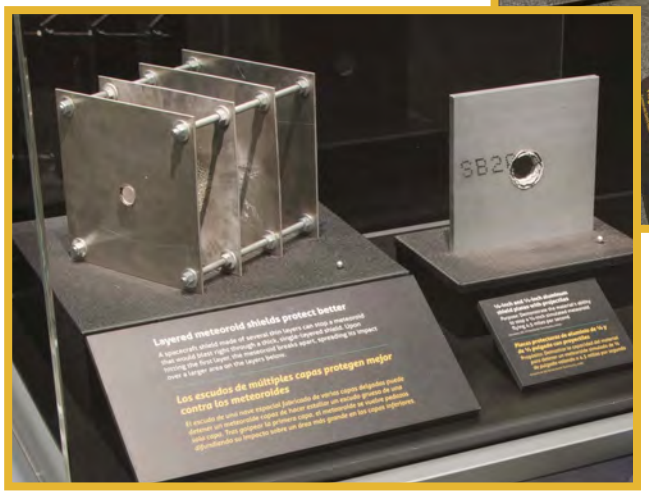
Meteoroids impact test video

Historic videos describing dangers of space and testing spacesuits

Vacuum bell jar
Experiment with a vacuum chamber to see how common objects behave in zero pressure. How low can the air pressure go before you can no longer hear a bell ringing? Does a fan create a breeze in a vacuum?

Section 1: Space can kill you

Spacesuit objects
Examine an x-ray of a full spacesuit, as well as real spacesuit objects, to see how they are engineered to protect astronauts from the many dangers they encounter in space.



Meteoroid shields
See the hole blown through a thick metal plate by a simulated meteoroid and watch slow motion video of the impact.

Objects

- Gloves worn by Neil Armstrong
- Apollo helmet
- Cut away spacesuit sleeve
- Canyon Diablo Meteorite
- Metal shields impacted by simulated meteorites
- Compacted trash tile under development for possible use as a radiation shield

Section 2: Traveling to and in space

Getting to space isn't easy, and once we're there the huge distances between destinations make travel a challenge. In this mini-section, visitors will take a look at some of the technologies that will take us where we want to go.

Topics covered

Newton's third law of motion

The high cost of getting to space

Possible future methods of traveling to and in space

Section 2: Traveling to and in space

Interactive & Multimedia Experiences

- Interactive touch graphics
- Water Rockets
- Working model ion engine
- Interview video with engineer explaining ion engines
- Earth from Space projection

Earth from Space projection

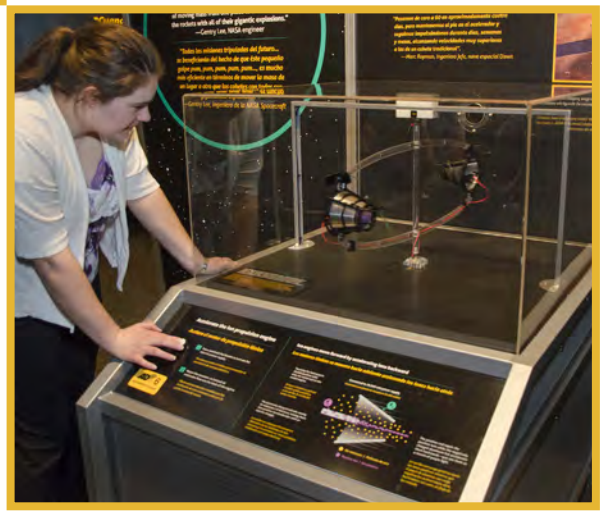
Gaze at the beauty of Earth as astronauts see it when you watch a large projection of images of Earth taken from orbiting spacecraft.

Water Rockets

Launch a water rocket. Experiment to find out how much water it takes to reach its maximum height.

Ion Engine

Turn on an ion engine and marvel as it moves forward propelled by ionized air molecules.



Section 3: Weightlessness

Astronauts look like they're floating, but they're actually falling. Freely falling objects are weightless. Gravity pulls at objects everywhere in space, but when something—like a spacecraft—moves fast enough, it falls around a planet or star, never hitting the ground. In this section visitors will explore why astronauts are weightless in space.

Topics covered

Orbital physics

The effects of free-fall

Section 3: Weightlessness

Interactive & Multimedia Experiences

Drop towers

Orbit air table

Why are astronauts weightless?
Animated video

Watch yourself "float" mirrors

Weightless Astronauts projection

Orbit air table
Explore orbital mechanics as you launch a puck into orbit around a planet in the center of a circular air hockey table.

Drop tower
Use a 14-foot drop tower equipped with a slow motion instant replay video to explore the effects momentary weightlessness has on objects.

Section 3: Weightlessness

Why are Astronauts Weightless?
Animated video
Don't really understand why astronauts float? Select questions and view short animations that help explain the amazing physics of orbital flight.

Watch yourself "float" mirrors
Imagine you're weightless in space. With these perpendicular mirrors visitors can create the optical illusion that they are floating.

Section 4: Living in space

Planet Earth makes life easy. Air and water? Taken care of. Using the bathroom? Gravity practically does the work for you. But in space, nothing is "normal." From work and exercise to eating and breathing, everything requires new solutions. Here visitors will learn some of the ways that living and working in space is different from life on Earth.

Topics covered

- Life on a space station
- Eating in space
- Peeing and pooping in space
- The health effects of life in space

Section 4: Living in space

Interactive & Multimedia Experiences

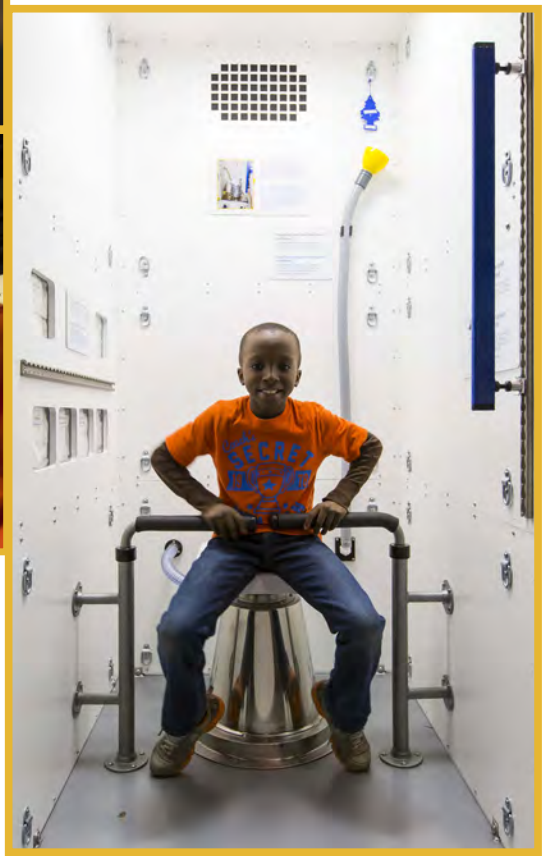
- Eating in Space video
- Space station dollhouse
- Daily life videos
- Toilet mockup
- Exercising in Space video
- Odor filter interactive

Space station dollhouse

Young visitors imagine what it would be like to live in space as they explore a dollhouse-size space station.

Toilet mockup

Have you ever wondered how astronauts go to the bathroom in space? Visitors can sit on a space toilet in this full-size mockup. On a nearby video, astronauts explain the ins and outs of answering the call of nature in space.



Section 4: Living in space

Experimental compression suit
This prototype suit, designed by engineers at MIT, might one day help astronauts stay healthier in space. Here visitors will learn why living in space can be bad for your health and explore some of the counter measures designed to help keep astronauts healthy.

Objects

- Space food
- Shuttle era urinal
- Apollo era fecal collection bag
- Experimental compression suit designed to prevent some of the damaging effects of living in space
- Shuttle era odor filter

Section 5: Working in space

Floating weightlessly around a space station sure looks like fun. But astronauts aren't there just to enjoy themselves, they're there to work. Building and maintaining a space station is a lot of work. And working in a bulky space suit or with a robotic arm can make the task at hand even more challenging. In this section, visitors can try some of the tools astronauts use when they work in space.

Topics covered

- Challenges of working in space
- Robotics to assist astronauts
- Artificial gravity
- Managing a space station's energy supply

Section 5: Working in space

Interactive & Multimedia Experiences

- Interactive touch graphics
- De-pressurized glove box
- Robotic arm
- Artificial gravity interactive
- Power your spacecraft

De-pressurized glove box
Working in a space suit is hard! Visitors will find out why when they try on a glove inside a partial vacuum.

Robotic arm
Control a robotic arm the way astronauts do, using hand controllers and video monitors to complete a task analogous to docking a supply vessel.

Section 5: Working in space

Power your spacecraft
In space, losing power can mean losing your life. Visitors are tasked with managing the energy system of an orbiting space station to keep their life support equipment running and stay alive.

Artificial gravity interactive
Experiment with centripetal force, a method of creating artificial gravity, which might one day change the way we live in space.

Section 6: Rotating Destiny Lab

Get a taste of the disorientation experienced by first-time astronauts when you enter a full-sized mock-up of the International Space Station's U.S. Destiny Lab module.

Section 6: Rotating Destiny Lab

As you stand on a platform, the module will slowly rotate around you, giving you the sensation of 'floating' in space. As features of Destiny come into view, lighting effects and narration will highlight the vital equipment of the module, from life support systems to the Canadarm2 robotic controls, telling the story of a research station orbiting 250 miles above the Earth.

Section 7: Our future in space

We're on a journey to space. It didn't stop at the moon, and it won't stop at the Space Station. We're looking farther out, overcoming challenges, and asking ourselves, "Where to next?" In this section visitors will be able to explore many different visions of what our future in space might be like.

Topics covered

Costs and benefits of space exploration

Challenges of human exploration and colonization of Mars

The relationship between mass and weight.

Section 7: Our future in space

Interactive & Multimedia Experiences

- Visitor feeback stations
- Make Your Home on Mars magnet wall
- The weight of peanut butter
- Interview videos about the future
- Future in space projection
- See Yourself in Mars photo-op

See Yourself on Mars
Look out through your space helmet and smile for a photo as you imagine yourself exploring the red planet.

Make Your Home on Mars
Imagine life on Mars as you construct a colony using magnets.

Section 7: Our future in space

The weight of peanut butter

The first humans on Mars will weigh less than they did on Earth. Visitors can see how an object's weight changes depending on its location by picking up jars of peanut butter that have been filled to weigh what they would on each of the planets.

Visitor feedback stations

Share your opinions with other visitors answering questions like, "Would you want to be on the first spaceship to land on Mars?" "How much should the U.S. spend on space exploration?" And "Should humans pursue a future in space?" Videos of new space entrepreneurs and NASA insiders answering the same questions inform the conversation.

SPACE

AN OUT-OF-GRAVITY EXPERIENCE

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Exhibition includes:

- 2 immersive rotating "Destiny" space station laboratories
- Over two dozen hands-on interactive components
- HD projections including the powerful "Launch Theater"
- Authentic NASA space artifacts
- 100% bilingual (English and Spanish) interpretation with tactile elements
- All A/V and media components
- Visitor program, props & staff scripts
- Educational facilitation package for turnkey support of field trips
- Exhibition website
- Marketing and PR material kit
- Convenient online access to all host museum presentation materials
- The highest standard of quality and support in the industry

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