

Teacher's Guide

Living in Space

Trunk



**Museum of the Rockies
600 West Kagy Blvd.
Bozeman, MT 59717**

Credits

The Museum of the Rockies seeks to understand, preserve, and interpret the natural and cultural history of the Northern Rocky Mountain region. The Museum accomplishes its mission through research, care of collections, exhibits, and educational programs consistent with the theme *One Place Through All of Time*, for the education and enjoyment of people of all ages.

The activities and materials in the Living in Space Trunk have been created to help students better understand how astronauts live and work in space. Four trunks will be created in this series on space, to include **Living in Space, Rockets!, Space Exploration, and Planets.**

Funding for this project was made possible by a generous grant from the **Montana Space Grant Consortium** in association with **NASA.**

**Museum of the Rockies
Living in Space Trunk**

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Museum of the Rockies Living in Space Trunk

Introduction

The Living in Space trunk has been designed to help students better understand how astronauts live in space. In microgravity, most routine activities, such as preparing a meal or exercising, are no longer easy chores and require the use of special equipment and techniques. This trunk was created to demonstrate how astronauts accomplish their daily routines and conduct the work that needs to be completed during their mission.

This trunk contains tabletop activities, curriculum, and audio/visual components that will help children learn about living in space. The tabletop activities have been designed for one child to a group of students at a time. These hands-on activities will help children actively learn about some of the obstacles astronauts face while living and working in space.

The enclosed curriculum has been included to help teachers enhance the tabletop activities. Various videos, slide sets, and CD-ROMs geared towards a wide variety of ages have also been included.

Please assist the museum in the evaluation of these trunk activities and components by completing the Evaluation Form located in the back of this Teacher's Guide and mail it to:

Outreach Trunks
Museum of the Rockies
600 West Kagy Blvd.
Bozeman, MT 59717

If you have any questions about shipping or scheduling trunks please call 406.994.5282.

Museum of the Rockies

Living in Space

Teacher's Guide

Objective:

The nine Living in Space tabletop activities included in this trunk have been designed for students to better understand how astronauts work in a microgravity environment in space. Students are encouraged to conduct simple experiments on Earth in a gravity environment and then theorize what astronauts might encounter doing similar activities in a microgravity environment.

Materials:

- 9 tabletop activities with text panels, materials, and stands
- 12 Liftoff to Learning videos with activity guides
- 6 videos
- 2 CDROMS
- 1 Teacher's Guide
- Various Curriculum and Liftoff to Learning Guides

Note Regarding Setting up the Panels:

Each of the nine activity panels should be placed in a wooden stand so they stand upright. Each activity has accompanying materials that should be placed in front of the appropriate panel. For example, the materials for panel ❶ should be placed in front of it.

Background Information:

For more information, activities, and resources regarding Living in Space please refer to one of the NASA curriculum, CD-ROMS, or Liftoff to Learning videos and guides enclosed in this trunk.

Museum of the Rockies
Living in Space
Tabletop Activities

To follow are the objectives for each tabletop activity found in the Living in Space trunk. A list of the enclosed materials needed for each activity is also listed. Also, suggestions for extra activities and videos to watch are given for each tabletop activity.

1. Living in Space

Objective: Students learn how living in space is different than living on Earth because of gravity.

Enclosed materials needed: apple, banana, and two astronaut models

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Working activities Living in Space Operation Liftoff: Book 2 (4-6 grades) Working activities	Liftoff to Learning: Living in Space Space Basics

2. Testing Gravity

Objective: Students learn the effect of gravity on Earth and microgravity in space.

Enclosed materials needed: straws, Ziplock bags, marbles, small plastic balls

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Working activities Living in Space Operation Liftoff: Book 2 (4-6 grades) Working activities	Liftoff to Learning: Microgravity Newton in Space Toys in Space II

3. Eating in Space

Objective: Students learn why astronauts use food trays to eat in space.

Enclosed materials needed: food tray, silverware, scissors, NASA food packets, astronaut pants

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Food activities Living in Space Operation Liftoff: Book 2 (4-6 grades) Food activities Space Food & Nutrition Activities 1 - 6	Liftoff to Learning: Living in Space

4. Storing Food in Space

Objective: Students learn why astronauts take dehydrated food with them in space.

Enclosed materials needed: scale, NASA dehydrated foods, rubber “natural” foods

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Food activities Living in Space Operation Liftoff: Book 2 (4-6 grades) Food activities Space Food & Nutrition Activities 1 - 6	Liftoff to Learning: Living in Space

5. Dressing in Space

Objective: Students learn why astronauts need to close their pockets in space.

Enclosed materials needed: vest, pencils, pads of paper

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Clothing activities Housing activities	Liftoff to Learning: Living in Space
Living in Space Operation Liftoff: Book 2 (4-6 grades) Clothing activities Housing activities	

6. Practicing for Space

Objective: Students learn to do a simple task while wearing bulky clothing.

Enclosed materials needed: "Astronaut" gloves, timer, puzzle

Suggested Curriculum	Suggested Videos
Suited for Spacewalking	Liftoff to Learning: Go for EVA!

7. Exercising in Space

Objective: Students learn about resistance training with the elastic bands that astronauts use in space.

Enclosed materials needed: Theraband® elastic bands

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Health activities	Liftoff to Learning: Go for EVA!
Living in Space Operation Liftoff: Book 2 (4-6 grades) Health activities	

8. Insulating for Space

Objective: Students learn how a spacesuit protects an astronaut.

Enclosed materials needed: insulated yellow and blue gloves, hot pack, cold pack

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Clothing activities	Liftoff to Learning: Go for EVA!
Living in Space Operation Liftoff: Book 2 (4-6 grades) Clothing activities Suited for Spacewalking	

9. Working in Space

Objective: Students learn how difficult it is to work in a gravity environment on Earth and a microgravity environment in space.

Enclosed materials needed: “Microgravity Simulator,” PVC piping

Suggested Curriculum	Suggested Videos
Living in Space Operation Liftoff: Book 1 (K-3 grades) Health activities Living in Space Operation Liftoff: Book 2 (4-6 grades) Health activities Suited for Spacewalking	Liftoff to Learning: Go for EVA!

Museum of the Rockies
Living in Space Trunk
NASA Curriculum and A/V Materials

An assortment of curriculum guides, activities, and fact sheets related to astronauts living in space are included in this trunk. They have been chosen to augment the tabletop activities. The curriculum guides are located in a separate binder entitled “**NASA Curriculum.**”

All of the curriculum guides can be photocopied or ordered through the following NASA Educator Resource Center:

NASA Ames Research Center
Educator Resource Center
Mail Stop 253-2
Moffett Field, CA 94035-1000
Phone (650) 604.3574
Fax (650) 604.3445

<http://ccf.arc.nasa.gov/dx/basket/trc/trchome.html>

Or through the NASA CORE Educational Resources Catalog, which is located in the “**Teacher’s Guide.**”

In addition, most of the curriculum guides listed below can be found on the web by going to <http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/>.

Curriculum Guide	Grades	Standards
Living in Space	K-3 4-6	science, life science, mathematics and technology, human health
Microgravity	5-12	chemistry, mathematics, physics
Space Food and Nutrition	K-8	science as inquiry, life science, science in personal and social perspectives, physical science

Suited for Spacewalking	5-12	science as inquiry, physical science, life science, Earth and space science, science and technology, science in personal and social perspectives, mathematics
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Videos and CD-ROMs:

A set of the video series “**Liftoff to Learning**” is included in this trunk. In addition, a complete set of guides is located in a separate binder entitled “**Liftoff to Learning Video Resource Guides.**”

The Space Shuttle Story: To the Heavens and Beyond

This video is the ultimate collection of shuttle adventures from our great chapter in space history. The story spans over 40 missions spanning eight years. **(60 minutes)**

Apollo 13: Houston, We’ve Got a Problem

Depicts the dramatic voyage of Apollo 13, in which the most serious accident ever to occur in space changed the mission from a routine lunar landing to a desperate fight for crew survival. The film ends with worldwide relief and joy when astronauts James Lovell, John Swigert, and Fred Haise splash down on target in the Pacific Ocean. **(28 minutes, grades 7-adult)**

Apollo 13

Stranded 205,000 miles from Earth in a crippled spacecraft, astronauts Jim Lovell, Fred Haise, and Jack Swigert fight a desperate battle to survive. Meanwhile, at Mission Control, astronaut Ken Mattingly, flight director Gene Kranz and a heroic ground crew race against time - and the odds - to bring them home. **(2 hours and 20 minutes, rated PG - some adult content)**

Astronomy Café

Hundreds of questions are answered by professional astronomer Dr. Sten Odenwald in this CD-ROM based upon the book and website of the same names. Organized around topics such as “Special and General Relativity” and “The Solar System”, this CD-ROM enables students to quickly find a question they want to find out about and get the answer. In addition, the CD-ROM contains a glossary, on-line resources, and a collection of useful tables. Extremely easy to use on either Windows or Macintosh computer platforms.

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NASA-based Internet Addresses

Enclosed is a listing of helpful NASA-based Internet addresses to use in conjunction with the tabletop activities. One of the best Internet sites to recommend is NASA's Spacelink site at:

<http://spacelink.nasa.gov/.index.html>

Additional sites to consider viewing are:

Montana Space Grant Consortium:

<http://www.montana.edu/~wwwmsgc/>

Amazing Space Activities:

<http://amazing-space.stsci.edu/>

<http://amazing-space.stsci.edu/trading/trading-inter-details.html>

The Astronomy Café:

<http://www.theastronomycafe.net/>

National Optical Astronomy Observatories (NOAO)

<http://www.noao.edu/education/>

NOAO Ask a Scientist

<http://www.noao.edu/education/NSTWques.html>

NOAO Sharing Science: Linking Students to Scientists and Engineers

<http://www.noao.edu/education/ncmlstg.html>

Centuri Corporation (model rockets supplier)

<http://www.launchpad2000.com/launchpad2000/index.html>

NASA/JSC: To Live and Work on the Space Shuttle

<http://lsda.jsc.nasa.gov/kids/L&W/livework.htm>

NASA Photo Gallery

<http://www.nasa.gov/gallery/photo/index.html>

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Evaluation Forms

Please assist the museum in the evaluation of this trunk by completing an Evaluation Form. Your comments will help us create future educational outreach trunks. Please return the completed forms to:

Programs Coordinator
Museum of the Rockies
600 West Kagy Blvd.
Bozeman, MT 59717

Thank you!

**We hope that you and your students enjoyed the
Living in Space Trunk.**

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Evaluation Form

Thank you for taking the time to fill out this evaluation form. Your comments will help us better plan future outreach trunks. Please return this form to:

Programs Coordinator
Museum of the Rockies
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Bozeman, MT 59717

Date: _____ Grade level(s) taught: _____

Name: (optional) _____

School name and address: _____

1. Which activity did you find most effective? Why?
2. How did you integrate the tabletop activities into your curriculum?
3. Which activity did you find least effective? Why?
4. Was the format of the activities easy to follow?

