Liftoff to Learning
Educational Videotape Series

Check the following Liftoff to Learning Educational Videotape Series programs that you have used in your classroom.

☐ All Systems Go!
☐ Assignment: Spacelab!
☐ The Atmosphere Below
☐ From Undersea to Outer Space
☐ Geography From Space
☐ Go for EVA!
☐ Let's Talk Robotics
☐ Living in Space
☐ Mathematics of Space
☐ Microgravity
☐ Newton in Space
☐ Plants in Space
☐ Space Basics
☐ Tethered Satellites Part 1
☐ Tethered Satellites Part 2
☐ Toys in Space II
☐ Voyage of Endeavour Then and Now

List the programs you liked best.

Identify topics of interest for future Liftoff to Learning Educational Videotape programs.

How can we improve the quality of the Liftoff to Learning Educational Videotape Series?

Your name and address:

EP-2002-07-344-HQ
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Liftoff to Learning
Educational Videotape Series

Every liftoff of the Space Shuttle is the beginning of a voyage of exploration and discovery. The experiences of Shuttle astronauts capture the imagination of students of all ages. Students study science, mathematics, geography, and technology with crew members aboard Space Shuttle flights. Space becomes the departure point for learning, integrating many other subject areas and bringing them to life.

Recognizing the potential of the Space Shuttle experience in the classroom, NASA’s Education Division and the Johnson Space Center’s Flight Crew Operations Directorate have joined forces to create a dynamic videotape series to support educators in the classroom. Liftoff to Learning captures the excitement of space flight and explains, in basic and practical terms, the scientific, mathematical, and technological concepts that make space flight possible. These learning tools also provide concrete examples of the global perspective space flight offers and the new frontiers of research and exploration space flight has created.

Taking advantage of state-of-the-art video production facilities and computer animation capabilities of the NASA Johnson Space Center, Liftoff to Learning programs combine the stunning visual images of space flight with clear and entertaining graphics. Each program comes with a printed video resource guide that provides valuable background information for teachers, resources for additional study, and practical hands-on demonstrations of some of the concepts presented in the videotapes.
All programs and publications in the Liftoff to Learning series are available at minimal cost from the NASA Educator Resource Center Network (ERCN). See the ERCN list on pages 20-22 for details on the center that serves your state.

The Liftoff to Learning series programs are also available by mail order nationally and internationally through NASA’s Central Operation of Resources for Educators (CORE). NASA CORE is a worldwide distribution center for NASA’s educational multimedia materials. Educators may request a catalog and order form by writing, calling, faxing, or e-mailing:

NASA CORE  
Lorain County Joint Vocational School  
15181 Route 58 South  
Oberlin, OH 44074  
Phone: (440) 775-1400  
Fax: (440) 775-1460  
E-mail: nasa_catalog@leeca.org  
NASA CORE Home Page:  
http://core.nasa.gov

The Liftoff to Learning Video Resource Guides that accompany the videotapes can be downloaded from NASA Spacelink at http://spacelink.nasa.gov/products. As new videotapes are added to the series, the Video Resource Guides will appear on Spacelink. See the inside cover of this brochure for details about NASA online resources for educators and the NASA Education Home Page.
All Systems Go!

*All Systems Go!* examines human physiologic changes that occur in astronauts while they are in microgravity and attempts to answer important questions on how the body readapts to Earth’s environment. The videotape shows research conducted aboard the Space Shuttle that examines the heart, lungs, blood, muscles, cells, and the immune system as part of six physiological systems. This program is segmented, enabling educators to extract topics that are most relevant to current classroom studies.

Length: 33:34

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<tr>
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<td>Biology Life Science</td>
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Assignment: Spacelab!

Assignment: Spacelab! demonstrates how proper laboratory procedures are as important in space as they are on Earth. This video emphasizes safety as well as reasons for experimental controls and other laboratory procedures. The program begins in a school science classroom where students are conducting an experiment without wearing eye protection. From the orbiter, astronauts reinforce the educator’s message and expand the explanation of why proper laboratory procedures are critical to all scientists.

Length: 16:05

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The Atmosphere Below

The Atmosphere Below illustrates the research scientists are conducting from Earth orbit to help understand changes that are taking place in Earth’s atmosphere. Space Shuttle astronauts explain the questions scientists hope can be answered by studying Earth’s atmosphere from space. Experiments discussed in this videotape focus on infrared detection of atmospheric remnants from volcanic eruptions, ozone concentration levels, and incoming solar ultraviolet radiation with respect to global warming, among others.

Length: 16:00

Grade Level

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<td>5–12</td>
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<tr>
<td>Earth Science</td>
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From Undersea to Outer Space

is the story of a life sciences experiment conducted on the first Spacelab Life Sciences Mission flown on the Space Shuttle. More than 2,000 jellyfish were sent into space so that scientists could learn about how living things adapt to the microgravity environment of Earth orbit. Scientists examined how microgravity affects the development of young jellyfish, especially their gravity receptors. The gravity receptors of jellyfish serve a purpose similar to that of the inner ear of human beings for balance and orientation.

Length: 15:06

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Geography from Space

Geography from Space takes students on a fast, fun video tour of Earth’s surface as seen from outer space. Through a clever combination of animation and computer graphics, viewers learn how altitude affects perspective. The video then develops into a travelogue on some of the interesting features of Earth’s continents (except for Antarctica) as seen from space.

Length: 14:29
Go for EVA!

Go for EVA! discusses how spacesuits protect astronauts from the hostile space environment, explains what the components of the spacesuit are, describes how the suit functions, and shows what types of work astronauts perform while spacewalking. Actual footage of spacewalks—also known as Extravehicular Activities (EVAs)—illustrates how spacesuits allow astronauts to operate scientific apparatus, assemble equipment and structures, pilot the Manned Maneuvering Unit, take photographs, and service satellites and space hardware.

Length: 13:48

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Let’s Talk Robotics

*Let’s Talk Robotics* explores the application of robots to space exploration. Robot terms are explained, and robots used on the Space Shuttle are shown. Animated scenes show how robots will be used to assist in the assembly of the International Space Station. Interspersed in the program are classroom scenes of ways in which intermediate and high school students are constructing and learning about robots.

Length: 14:41
Living in Space

Living in Space demonstrates what it is like to live and work in space. Viewers are invited to join the astronauts as they go through their daily routine living onboard the Space Shuttle. This program answers many of the basic questions students ask astronauts about living in space. Students gain insight into the similarities and differences in eating, exercising, relaxing, maintaining personal hygiene, sleeping, and working in space versus on Earth.

Length: 10:00

<table>
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Mathematics of Space—Rendezvous

Mathematics of Space—Rendezvous demonstrates the mathematical operations needed to enable the crew of STS-84 to rendezvous with the Russian Mir Space Station. Students in a middle school mathematics class are invited to help the crew solve some basic problems. The program has several stopping points where viewers of the tape can try the problems themselves.

Length: 17:00

<table>
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<td>Mathematics</td>
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Microgravity

Microgravity describes the restrictions that gravity imposes on scientific experimentation and how these restrictions can be greatly reduced in the exciting research environment of the Space Shuttle and, later, on the International Space Station. The program focuses on four scientific disciplines in microgravity studies: fluid physics, materials science, biotechnology, and combustion. Experiments within these disciplines explore how the effects of buoyancy-driven convection and sedimentation, seen in ground-based laboratories, are diminished in space, allowing scientists to expand their knowledge in these areas.

Length: 23:24

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Newton in Space

Newton in Space offers an introduction to Isaac Newton’s Laws of Motion and how these laws apply to space flight. The program explains the difference between weight and mass; the basic principles of balanced and unbalanced forces, as well as actions and opposite reactions; and how the three laws of motion affect the way a rocket operates. Using the microgravity environment of Earth orbit, Space Shuttle astronauts conduct simple force and motion demonstrations in ways not possible on Earth.

Length: 12:37

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<td>Physical Science</td>
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</table>
Plants in Space

Plants in Space investigates the effects of microgravity on corn plants grown onboard the Space Shuttle in orbit. Elementary students assist in the experiment by growing control plants in a one-gravity environment on Earth. Plant growth terms such as geotropism and phototropism are explained. Students viewing the program can participate in the experiment by growing similar plants in their classrooms. Instructions for the control experiment are contained in the accompanying guide.

Length: 12:15

<table>
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<td>5–12</td>
<td>Life Science</td>
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</table>
Space Basics

Space Basics answers commonly asked questions about space flight, including how spacecraft travel into space, how spacecraft remain in orbit, why astronauts float in space, and how spacecraft return to Earth. Viewers learn how English scientist Isaac Newton formulated the basic science behind Earth orbit more than 300 years ago.

Length: 20:55
Tethered Satellites Part 1
(Forces and Motion)

Part 1: Tethered Satellite—Forces and Motions demonstrates the principle behind a unique scientific satellite that the Space Shuttle deployed into space attached to the Shuttle by a thin line. Crew members on this joint mission between the United States and Italy describe the project and the many physical principles involved that permit it to work, such as angular momentum, center of mass, Coriolis Effect, and more.

Length: 21:12

<table>
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<th>Grade Level</th>
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<td>9–12</td>
<td>Physical Science</td>
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Tethered Satellites Part 2
(Electrical Circuits in Space)

Part 2: Tethered Satellite—Electrical Circuits in Space
continues the topic of tethered satellite systems in space by showing how the system generates electricity as it passes through Earth’s magnetic field. Several basic electrical experiments are shown that help explain the concepts and principles involved.

Length: 18:50
Toys in Space II

Toys in Space II provides a hands-on way for students to investigate the scientific principles that make many common toys function. The Space Shuttle crew invite students to experiment with similar toys in their classrooms and hypothesize how these same toys will operate in microgravity. Scenes of the astronauts operating the toys in space serve as data with which students confirm or reject their hypotheses.

Length: 37:49

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Applications</th>
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<tbody>
<tr>
<td>K–12</td>
<td>Physical Science</td>
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Voyage of Endeavour
Then and Now

Voyage of Endeavour Then and Now captures the excitement of the maiden flight of NASA’s Space Shuttle Endeavour and contrasts it with its namesake, the seventeenth-century research sailing vessel commanded by James Cook. Students will experience Endeavour’s historic rescue of the stranded INTELSAT VI satellite and the first three-person extravehicular activity (EVA). Cook’s voyage provides an apt parallel by charting unexplored land and waters in the South Pacific, New Zealand, and Australia, and by using scientists and artists to collect data on plants, wildlife, and native peoples.

Length: 19:00

Grade Level | Applications
---|---
5–12 | History/Social Studies, Technology Education
Liftoff to Learning videotapes are available from NASA Educator Resource Centers.

If you live in . . . Please contact:

AK, HI, ID, MT, NV, OR, UT, WA, WY, or Northern CA (southern-most counties of Inyo, Kings, Monterey, Tulare)

NASA Educator Resource Center
NASA Ames Research Center
Mail Stop 253-2
Moffett Field, CA 94035-1000
Phone: (650) 604-3574
FAX: (650) 604-3445
http://amesnews.arc.nasa.gov/erc/erchome.html

AZ, or Southern CA (northern-most counties of Kern, San Bernardino, San Luis Obispo)

NASA Educator Resource Center
NASA Dryden Flight Research Center
PO Box 273, MS 4839
Edwards, CA 93523-0273
Phone: (661) 276-5009
Toll-Free: 800-521-3416, ext. 5009
FAX: (661) 276-3088
http://www.dfrc.nasa.gov/trc/ERC

CA

NASA Educator Resource Center for NASA Jet Propulsion Laboratory
Village at Indian Hill
1460 East Holt Ave., Suite 20
Pomona, CA 91767
Phone: (909) 397-4420
FAX: (909) 397-4470
http://learn.jpl.nasa.gov/resources/resources_index.html

IL, IN, MI, MN, OH, WI

NASA Educator Resource Center for NASA Glenn Research Center
21000 Brookpark Rd., MS 8-1
Cleveland, OH 44135
Phone: (216) 433-2017
FAX: (216) 433-3601

CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT

NASA Educator Resource Center
NASA Goddard Space Flight Center
Mail Code 130.3
Greenbelt, MD 20771
Phone: (301) 286-8570
FAX: (301) 286-1781
http://www.gsfc.nasa.gov/vc/erc.htm
If you live in... Please contact:

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<tr>
<td>VA’s and MD’s Eastern Shores</td>
<td>NASA Educator Resource Center for GSFC/Wallops Flight Facility Building J-17 Wallops Island, VA 23337 Phone: (757) 824-2298 FAX: (757) 824-1776 <a href="http://www.wff.nasa.gov/~WVC/ERC.htm">http://www.wff.nasa.gov/~WVC/ERC.htm</a></td>
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<tr>
<td>CO, KS, NE, NM, ND, OK, SD, TX</td>
<td>NASA Educator Resource Center for NASA Johnson Space Center Space Center Houston 1601 NASA Road One Houston, TX 77058 Phone: (281) 244-2129 FAX: (281) 483-9638 <a href="http://www.spacecenter.org/educator_resource.html">http://www.spacecenter.org/educator_resource.html</a></td>
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<tr>
<td>KY, NC, SC, VA, WV</td>
<td>NASA Educator Resource Center for NASA Langley Research Center Virginia Air and Space Center 600 Settlers Landing Road Hampton, VA 23669-4033 Phone: (757) 727-0900, Ext. 757 FAX: (757) 727-0898 <a href="http://www.vasc.org/erc">http://www.vasc.org/erc</a></td>
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<tr>
<td>AL, AR, IA, LA, MO, TN</td>
<td>NASA Educator Resource Center for NASA Marshall Space Flight Center U.S. Space &amp; Rocket Center One Tranquility Base Huntsville, AL 35807 Phone: (256) 544-5812 FAX: (256) 544-5820 <a href="http://erc.msfc.nasa.gov">http://erc.msfc.nasa.gov</a></td>
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<tr>
<td>MS</td>
<td>NASA Educator Resource Center NASA Stennis Space Center Mail Stop 1200 Stennis Space Ctr., MS 39529-6000 Phone: (228) 688-3338 Toll Free: (800) 237-1821 FAX: (228) 688-2824 <a href="http://education.ssc.nasa.gov/erc/erc.htm">http://education.ssc.nasa.gov/erc/erc.htm</a></td>
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### Subject Matrix

#### Educational Videotape Series

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### Notes

- Go for EVA!
- Mathematics of Space—Rendezvous
- Tethered Satellites—Part 1 and 2
- Toys in Space II
- Voyage of Endeavour Then and Now
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- [ ] Newton in Space
- [ ] Plants in Space
- [ ] Space Basics
- [ ] Tethered Satellites Part 1
- [ ] Tethered Satellites Part 2
- [ ] Toys in Space II
- [ ] *Voyage of Endeavour* Then and Now

List the programs you liked best.

________________________________________

Identify topics of interest for future *Liftoff to Learning* Educational Videotape programs.

________________________________________

How can we improve the quality of the *Liftoff to Learning* Educational Videotape Series?

________________________________________

________________________________________

Your name and address:

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