Space Station

Level (Grades K-5)

Dear Teacher:

This material has been developed to provide a guide to hands-on experiences in science and math. The lesson plans are written to be used by the students in groups of two to four people in a lab-type activity. The lesson activities are outlined using the scientific method. All questions should be used to lead the students to explore a subject, and the activities should be open ended.

Each lab session should begin with a brief discussion of the Theory/Information section of the lesson plan. The teacher should feel free to adjust the information and activities to meet the needs of the students. For the very young, the teacher may lead the activity and adapt the questions.

These plans are intended to be used by students. The teacher will actively participate by moving among the students to help each group to organize, supply materials, provide information, and answer questions.

The space station is already capturing the imaginations of American students, encouraging them to pursue a career in the sciences. The idea of living and working in space continues to spark this renewed interest. It is with this desire that we dedicate this educational work to encouraging our children to pursue their dreams. The space station will motivate, stimulate, and capture our children's imagination as only space exploration can.

Space Station Partners
for Educational Advancement

Introduction

Level (Grades K-5)

Introduction to the National Aeronautics and Space Administration (NASA) and the United States Space Station Program.

The National Aeronautics and Space Administration (NASA) is an independent federal agency with headquarters in Washington, D.C. This federal agency does nonmilitary research into problems of flight within and beyond Earth's atmosphere. In 1958 the Space Act Agreement established the National Aeronautics and Space Administration. Since that time NASA has experimented with rockets, unmanned probes and satellites, and manned missions including the Apollo moon missions, and the Space Shuttle flights.

The United States Space Station Program is also under the direction of the National Aeronautics and Space Administration. After the first Space Shuttle flew in April of 1981, a space station was considered to be the next logical step in human space flight. In May 1982, the Space Station Task Force was formed and produced a space station concept.

In 1984 after many studies, President Reagan committed the nation to the goal of developing a space station with permanent human occupancy within the decade. At that time he also stressed international participation, and NASA invited other countries to work with the United States to develop a space station. Finally in September of 1988, Japan, Canada and 9 of the 13 nations involved with the European Space Agency (ESA) agreed to work together on the Space Station Program. The nine European Space Agency members are Belgium, Denmark, France, Italy, the Federal Republic of Germany, the Netherlands, Norway, Spain and the United Kingdom.

In 1992, President Clinton asked NASA to redesign the station to lower the cost. NASA, with the help of aerospace contractors such as The Boeing Company, began working on the redesign. During the planning, it was decided that members of the Russian Space Agency would help with the new space station.

The Human-Tended Capability, the first phase of space station, will be achieved in 1998 after only four of thirty-five Assembly Flights. This first phase includes the laboratory module. The final phase, Permanent Human Capacity, is scheduled for 2003. The station is designed to operate for at least 10 years.

Introduction (Continued):

Level (Grades K-5)

Introduction to the National Aeronautics and Space Administration (NASA) and the United States Space Station Program.

The space station will support six crew members. The crew will serve for 90 days, and will then be replaced by another crew of six. The crew will be rotated four times each year. Crew members involved in long-duration microgravity studies may serve six months or more before they return to Earth.

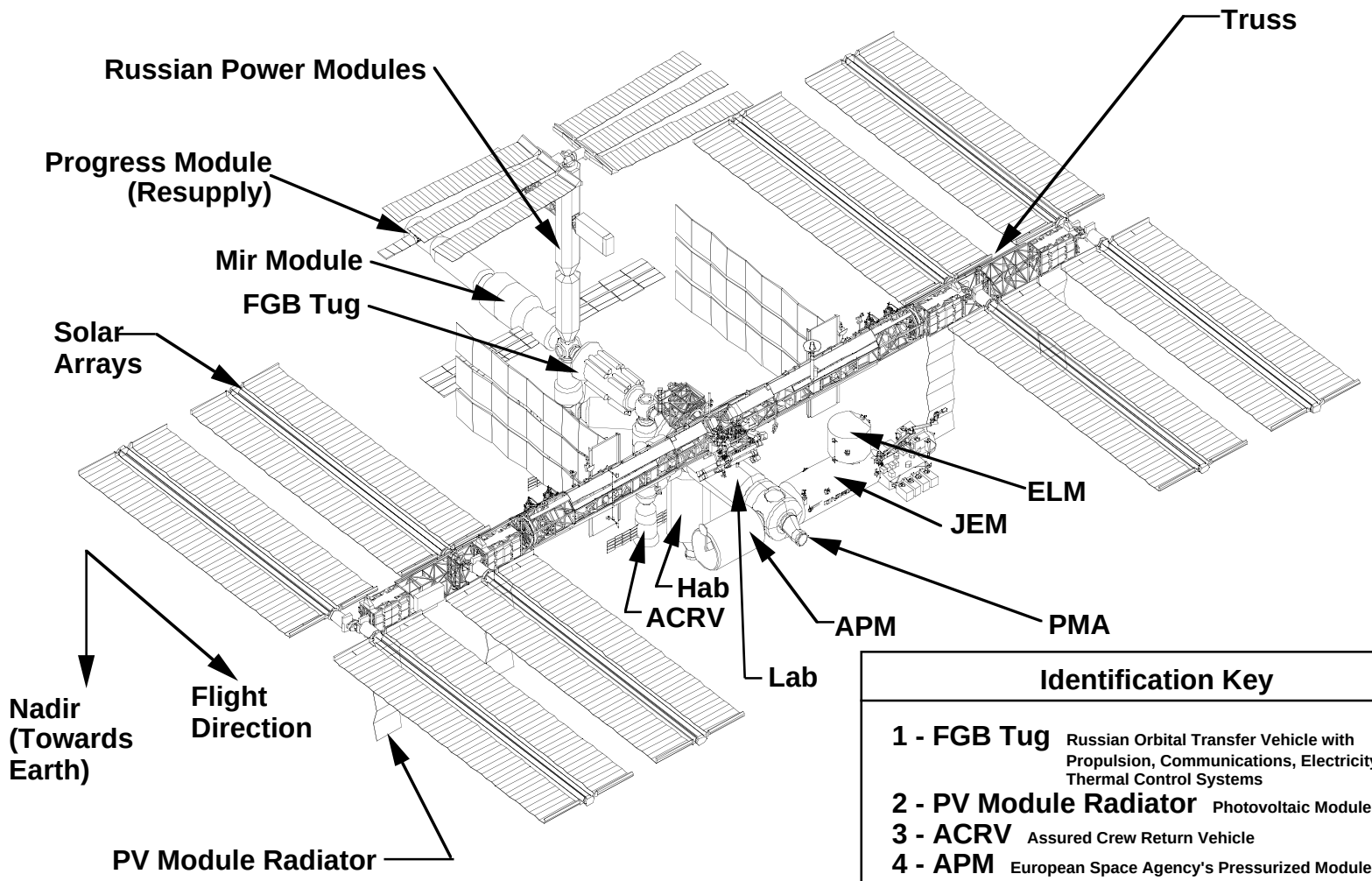
The space station will travel at a speed of about 29,000 kilometers per hour (18,000 miles per hour), and it will complete one orbit every 90 minutes. The station will operate at an altitude of 335 to 460 kilometers (208 to 285 statute miles). This is about the distance from New York to Washington, D.C.

The space station will be a permanent Earth orbiting laboratory. By observing and collecting information from the space station, scientists will learn more about our home planet, Earth. By collecting information, conducting experiments, and manufacturing materials on orbit, they will develop new processes and technologies. The biological studies done on orbit also hold great promise for the development of new medicines and the understanding of various diseases such as anemia and osteoporosis.

A space station is also needed to help humans to continue to explore space. The station will encourage international cooperation in science and technology while enabling scientists to perform significant long-duration space research in materials and life sciences. While building the station, scientist and engineers will also learn more about building, maintaining, and operating advanced human and autonomous space systems.

The space station will allow scientists more time to study and experiment in very low gravity, more power for equipment, and more room to work.

Space Station Configuration



Identification Key

1 - FGB Tug — Russian Orbital Transfer Vehicle with Propulsion, Communications, Electricity, and Thermal Control Systems
2 - PV Module Radiator — Photovoltaic Module Radiator
3 - ACRV — Assured Crew Return Vehicle
4 - APM — European Space Agency's Pressurized Module
5 - Hab — Habitat Module
6 - Lab — Laboratory Module
7 - PMA — Pressurized Mating Adaptor
8 - ELM — Experimental Logistics Module
9 - JEM — Japanese Experimental Module
10 - Mir — Russian Module

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NASA Teacher Resource Centers

NASA maintains collections of video tapes, laser video disks, slides and printed materials for use by educators. These collections, located in Teacher Resource Centers in each of the NASA Educational Service Regions, are available for perusal by educators. Each center features duplicating equipment for copying video tapes, audio cassette tapes, 35 millimeter slides, computer software, and lesson plans. In addition, NASA educational publications including curriculum guides, are available. Contact the Teacher Resource Center serving your state to arrange for educational material assistance.

If you live in	Contact
Alaska Arizona California Hawaii Idaho Montana Nevada Oregon Utah Washington Wyoming	NASA Ames Research Center Attn: Teacher Resource Center Mail Stop: TO-25 Moffett Field, CA 94035 415-694-6077
Connecticut Deleware District of Columbia Maine Maryland Massachusetts New Hampshire New Jersey New York Pennsylvania Rhode Island Vermont	NASA Goddard Space Flight Center Attn: Teacher Resource Laboratory Mail Stop: 130-3 Greenbelt, MD 20771 301-286-8570

NASA Teacher Resource Centers

If you live in	Contact
Colorado Kansas Nebraska New Mexico North Dakota Oklahoma South Dakota Texas	NASA Johnson Space Center Attn: Teacher Resource Room Mail Stop: AP-1 Houston, TX 77058 713-483-8696
Florida Georgia Puerto Rico Virgin Islands	NASA Kennedy Space Center Attn: Educators Resource Laboratory Mail Stop: ERL Kennedy Space Center, FL 32899 305-867-4090 or 9383
Kentucky North Carolina South Carolina Virginia West Virginia	Virginia Air & Space Museum Attn: Teacher Resource Center 600 Setter's Landing Road Hampton, VA 23669 804-727-0800
Illinois Indiana Michigan Minnesota Ohio Wisconsin	NASA Lewis Research Center Attn: Teacher Resource Center Mail Stop: 8-1 2100 Brookpark Rd Cleveland, OH 44135 216-433-2017
Alabama Arkansas Iowa Louisiana Missouri Tennessee	U.S. Space and Rocket Center Attn: NASA Teacher Resource Center P.O. Box 070015 Huntsville, AL 35807-7015 205-544-5812
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