



Discover NASA and You

An Educator Guide



Discover NASA and You

A Digital Learning Network Experience



**National Aeronautics and
Space Administration**

Designed To Share

The Vision for Space Exploration

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Digital Learning Network (DLN) Expedition

A DLN Expedition is a one time connection that allows students to experience NASA first-hand. Each expedition features an integrated educational package of grade-appropriate instruction and activities centered around a 50 minute videoconference. Students participate in a Question and Answer session with a NASA education specialist or a NASA Subject Matter Expert.

The sequence for a DLN Expedition includes:

- Students review vocabulary and complete Pre-Classroom Activities
- A one time DLN videoconference connection with in-formal student participation.
- Students complete Post-Activity Assessment and online evaluation for teacher and students.



Expedition Overview

Grade Level(s) 4-8

Focus Question

The National Aeronautics and Space Administration, or NASA, has accomplished many milestones which have broadened human kind's knowledge of outer space. What has NASA achieved in space, what are they doing currently, and what is in store for space exploration?

Benefits

This program is designed to be cross curricular with STEM, History, and English. This program will heighten the public's interest in NASA in general while focusing student's awareness of NASA's past, present, and future missions. The benefits of space exploration will also be discussed. Attention will be paid to the potential energy sources which can be harvested from the Moon.

5 E Model for Discover NASA and You

- **Engage-** The learner share prior knowledge about NASA's past, present, and future missions to the Moon and Mars.
- **Explore-** The learner will discover how NASA's accomplishments in the past paved the way for future events.
- **Explain-** The learner will discuss the concepts of Program Constellation and explain why we are returning to the Moon and looking to go on to Mars soon afterwards.
- **Elaborate-** The learner will recognize the challenges of living and will develop innovations to mediate those challenges.
- **Evaluate-** The learner will demonstrate their understanding by answering game-show like questions throughout the program to review NASA history. Learners will also demonstrate their knowledge of NASA's history by completing a post-activity assessment, and comparing those results to their pre-activity assessment.

SEQUENCE OF EVENTS

Pre-Conference Requirements

A pre-assessment tool is available to determine the students' level of understanding prior to the videoconference. Suggested answers are included.

Expedition Videoconference

The *Discover NASA and You* is intended as a stimulating history lesson about NASA for students in grades 4th-12th. As NASA is celebrating its 50th anniversary in 2008, this lesson will serve to show students what humans have accomplished in space, and what they may accomplish in space years ahead from now. This module contains various teaching methods to generate interest in all things NASA.

The DLN's hope is to inspire the next generation in becoming more involved with science and technology. By demonstrating all the great things NASA has accomplished in the past, and what NASA will achieve in the future, we hope to realize this goal.

Post-Conference Requirements

A post-assessment tool is available to determine changes in student levels of understanding.

NASA Education Evaluation Information System (NEEIS) Feedback Forms

Educator and student feedback forms are available online for all DLN events.



National Standards

National Council for the Social Studies (NCSS) (from www.ncss.org)

Social Studies Middle Grades	Timeline Activity	Three Ways to Change Your Attitude	Essay Questions
Theme II: Time, Continuity and Change			
Identify and use key concepts such as chronology, causality, change, conflict, and complexity to explain, analyze, and show connections among patterns of historical change and continuity.	X		
Theme VIII: Science, Technology, and Society			
Examine and describe the influence of culture on scientific and technological choice and advancement, such as in transportation, medicine, and warfare.	X		

National Science Education Standards (NSES) (from www.nap.edu)

**PLEASE NOTE: Due to the extensive amount of Science standards, expected student behaviors are listed below as text. The standards for each lesson are listed in the chart below.

K-12 Content Standard – Unifying Concepts

Evidence, models, and explanation – *At the upper grades, the standard should facilitate and enhance the learning of scientific concepts and principles by providing students with a big picture of scientific ideas--for example, how measurement is important in all scientific endeavors.*

Science	Timeline Activity	Essay Questions
K-12 Content Standard: Unifying Concepts		
Evidence, models and explanation		

National Council of Teachers of English (NCTE) (from www.ncte.org)

Language Arts	Timeline Activity	Essay Questions
4. Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes		X
5. Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.		X
7. Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.	X	X
8. Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.	X	X
9. Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.		X
12. Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).		X

*Depending on the methods used by the student to complete the assigned essay questions, more standards may be met than listed above.

International Technology Education Association (ITEA) (from www.iteaconnect.org)

<i>Technology</i>	Timeline Activity	Essay Questions
2d: Optimization and Trade-offs		
13a: Collect information and judge quality	X	
13c: Employ assessment techniques		

International Society for Technology in Education (ISTE) (from www.iste.org)

<i>Technology</i>	Timeline Activity	Essay Questions
3. Technology productivity tools		
Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.	X	X
5. Technology research tools		
Students use technology to locate, evaluate, and collect information from a variety of sources.	X	
Students use technology tools to process data and report results.		

Texas Essential Knowledge and Skills (TEKS) (<http://www.tea.state.tx.us/teks/>)

<i>Social Studies</i>	Timeline Activity	Essay Questions
§113.6 Grade 4	B5A, B21B, B21C	
§113.7 Grade 5	B5A, B5B, B24A	
§113.22 Grade 6	B2, B20A, B20B	
§113.23 Grade 7	B20A, B20B	
§113.24 Grade 8	B29A, B29B	

<i>Language Arts</i>	Timeline Activity	Essay Questions
Grade 4	B13D	B8B, B11A, B13, B15A-C
§110.7 Grade 5	B13D	B8B, B11A, B13, B15A-C
§110.22 Grade 6	B10L, B13D	B8B, B10H, B10L, B11A, B13, B15A-C
§110.23 Grade 7	B10L, B13D	B8B, B10H, B10L, B11A, B13, B15A-C
§110.24 Grade 8	B10L, B13D	B8B, B10H, B10L, B11A, B13, B15A-C



Pre-Conference Requirements

Pre-Assessment

A week before the event, please give your students this pre-conference assessment. It will gauge what your students already know about America's space program. Shortly after the conference, give them the same questionnaire. The successfulness of student comprehension can then be measured.

Pre-Conference Assessment Questions

- 1. In what year was NASA created?**
- 2. Who was the first American in space?**
- 3. What was the name of the program that sent astronauts to the moon?**
- 4. What was the name of America's first space station?**
- 5. How is the space shuttle remarkable?**
- 6. How has the Hubble Space telescope advanced our understanding of our solar system, galaxy, and universe?**
- 7. How big is the International Space Station?**
- 8. What are the names of the rovers that are currently exploring the Martian surface?**
- 9. What is the main goal of Project Constellation?**
- 10. What is the importance of building a lunar base?**

Answers to Pre and Post Assessment Questions:

1. In what year was NASA created?

1958

2. Who was the first American in space?

Alan Shepard

3. What was the name of the program that sent astronauts to the moon?

Apollo

4. What was the name of America's first space station?

Skylab

5. How is the space shuttle remarkable?

It is reusable

6. How has the Hubble Space telescope advanced our understanding of our solar system, galaxy, and universe?

It gives scientists a better picture of what is in outer space. Scientists no longer have to worry about interference from the Earth's atmosphere.

7. How big is the International Space Station

32,300 cubic feet, or about as big as a football field

8. What are the names of the rovers that are currently exploring the Martian surface?

Spirit and Opportunity

9. What is the main goal of Project Constellation?

To travel to the Moon and beyond

10. What is the importance of building a lunar base?

To learn how to live somewhere besides Earth so we are prepared to visit Mars.



Expedition Videoconference Guidelines

Audience Guidelines

Teachers, please review the following points with your students prior to the event:

- Videoconference is a two-way event. Students and NASA presenters can see and hear one another.
- Students should speak in a loud, clear voice. If a microphone is placed in a central location instruct the students to walk up and speak into the microphone.
- Teacher(s) should moderate students' questions and answers.
- Students are expected to be respectful to the presenter. A quiet atmosphere should be maintained at all times to enhance the experience for all involved.
- *Students are sometimes initially shy about responding to questions during a distance learning session. Explain to the students that this is an interactive medium and we encourage questions.*

Teacher Event Checklist

Date Completed	Pre-Conference Requirements
	1. Print a copy of the module.
	2. Have the students complete the pre-assessment.
	3. Email questions for the presenter. This will help focus the presentation on the groups' specific needs.
	4. Review the audience guidelines.
	Day of the Conference Requirements
	1. The students are encouraged to ask the NASA presenter qualifying questions about the expedition.
	2. Follow up questions can be continued after the conference through e-mail.
	Post - Conference Requirements
	1. Students are administered the post-assessment to demonstrate their new knowledge of the subject.
	2. Teacher(s) and students fill out the event feedback online (NEEIS).



Expedition Videoconference Outline

Summary of *Discover NASA and You* Videoconference

Ever since humans gazed up at the night sky, wonder has filled their thoughts. From the days of the Vikings to Columbus to Sir Edmund Hillary, humans have been explorers. It was only a matter of time before the navigation of space would commence.

Telescope development was an important part of the human understanding of the cosmos. Rocket development in the early 20th century allowed better study of the environment beyond Earth's atmosphere. In the 1960's humans entered the environment of space. The ultimate achievement in technological advancement took place when humans touched the surface of the moon during the Apollo 11 mission.

Space exploration continued through the latter half of the 20th century. Many probes and satellites were sent out into the vast expanses of space to beam back information about our closest relatives. Continuous human occupation of space was a regular occurrence by the end of the 20th century. Thus, humans had become a permanent fixture of outer space.

After the Columbia tragedy, a refocusing of the U.S. space program occurred. As a result, NASA's intentions are to push forward with a robust manned space program that will target the Moon and other locations for manned missions.

Outline for Video Conference (45-60 minutes)

- I. Welcome
- II. Introduction
- III. NASA yesterday
- IV. NASA today
- V. NASA tomorrow
- VI. The Vision for Space Exploration (Constellation)
- VII. Moon colonization
- VIII. Careers/Website
- IX. Q&A
- X. Good-Bye



Pre-Conference Activities



Activity #1

DISCOVER NASA AND YOU: A TIMELINE ACTIVITY

Teacher Sheet(s)

- Objective:** The learner will exercise and expand their knowledge on NASA history by:
- Utilizing research skills to collect information on NASA historical figures and events;
 - Sequence events in chronological order on a timeline

Grade Level: 4-8

Subject(s): Social Studies – History; Language Arts – Comprehension, Sequencing

Duration: 1 class period, or at the teacher's discretion

Materials:

- List of important people and events (share a list with each student or write on board)
- Research materials, i.e.:
 1. computers with internet access
 2. encyclopedias
- Writing utensils
- Paper
- Blank timeline (optional)

Important People and Events

Alan Shepard
Apollo 11
Apollo Program
Edward White
Gemini Program
International Space Station
John Glenn
Launch of Explorer I
Launch of Sputnik
Mercury Program
President Kennedy speaks at Rice University

President Kennedy speaks to Congress
Proposed date for NASA's return to the Moon
Robert Goddard
Space Shuttle Program
Skylab Program
US government establishes NASA
US launches "Ham" the chimpanzee
Wernher von Braun
World War II
Yuri Gagarin

NOTE: This activity may be used during the video conference event to enhance the student's learning experience.

Procedure:

1. Provide students with the list of *important people and events*.
2. Allow students time to research each event and person, paying special attention to the date, location, and country represented.
3. Once research is complete, students (either individually or in groups) will organize information in chronological order on a sheet of paper.
4. On a separate sheet of paper, students will construct a timeline that will best organize the information.
5. Complete the timeline by placing the people and events in the correct place.

This lesson may be done as an individual, small group, or large group activity. For more ideas, please refer to "Activity Extension".

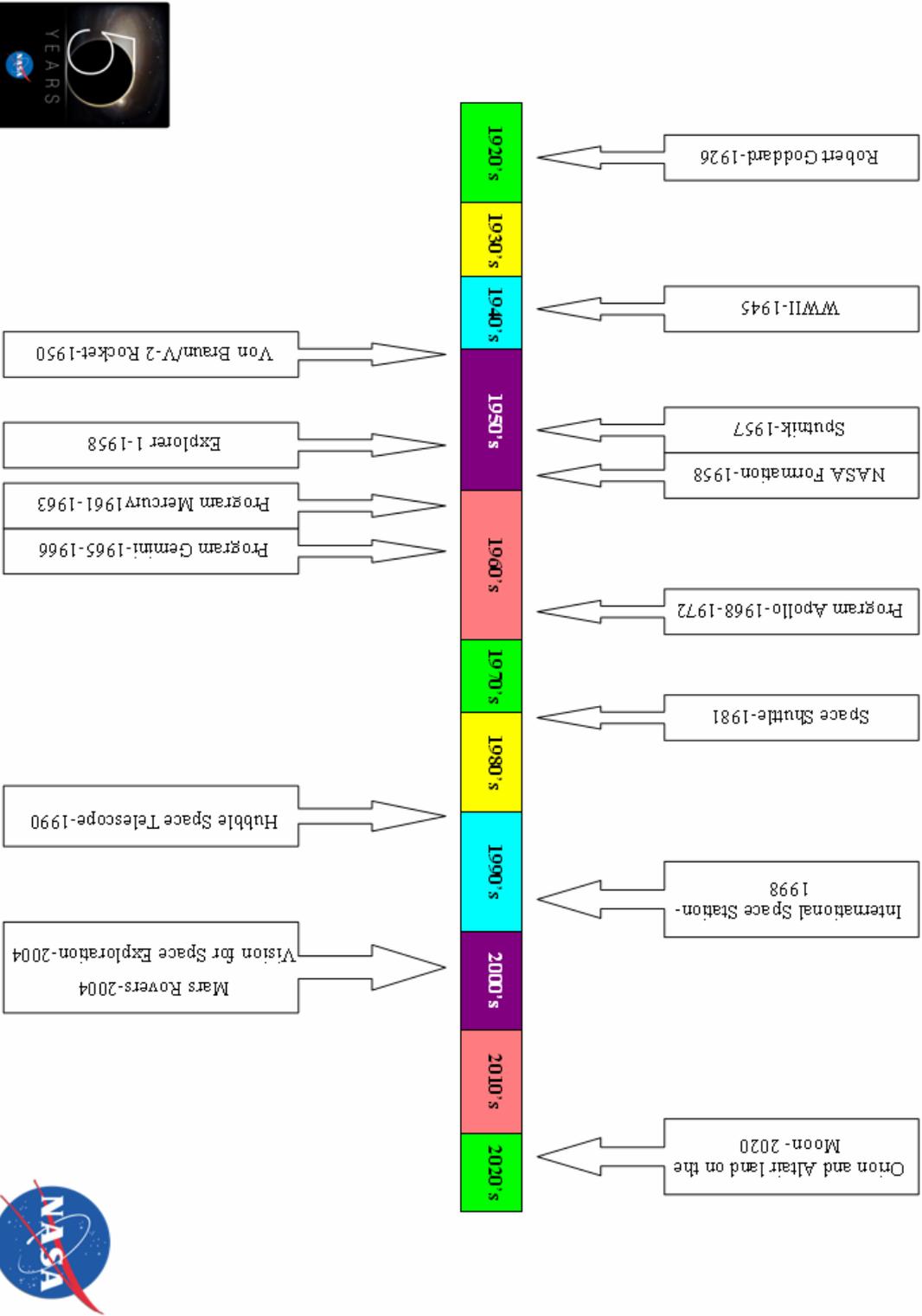
Feel free to use the provided timelines below. The completed timeline is the teacher's version and may be used as a guide for what information may be entered into the blank student version.

Activity Extension:

- Individual Activity: Describe the impact each event or person had on US and/or World history in written annotations for each entry.
- Class Activity: Find images of the important people and events, and create an illustrated timeline

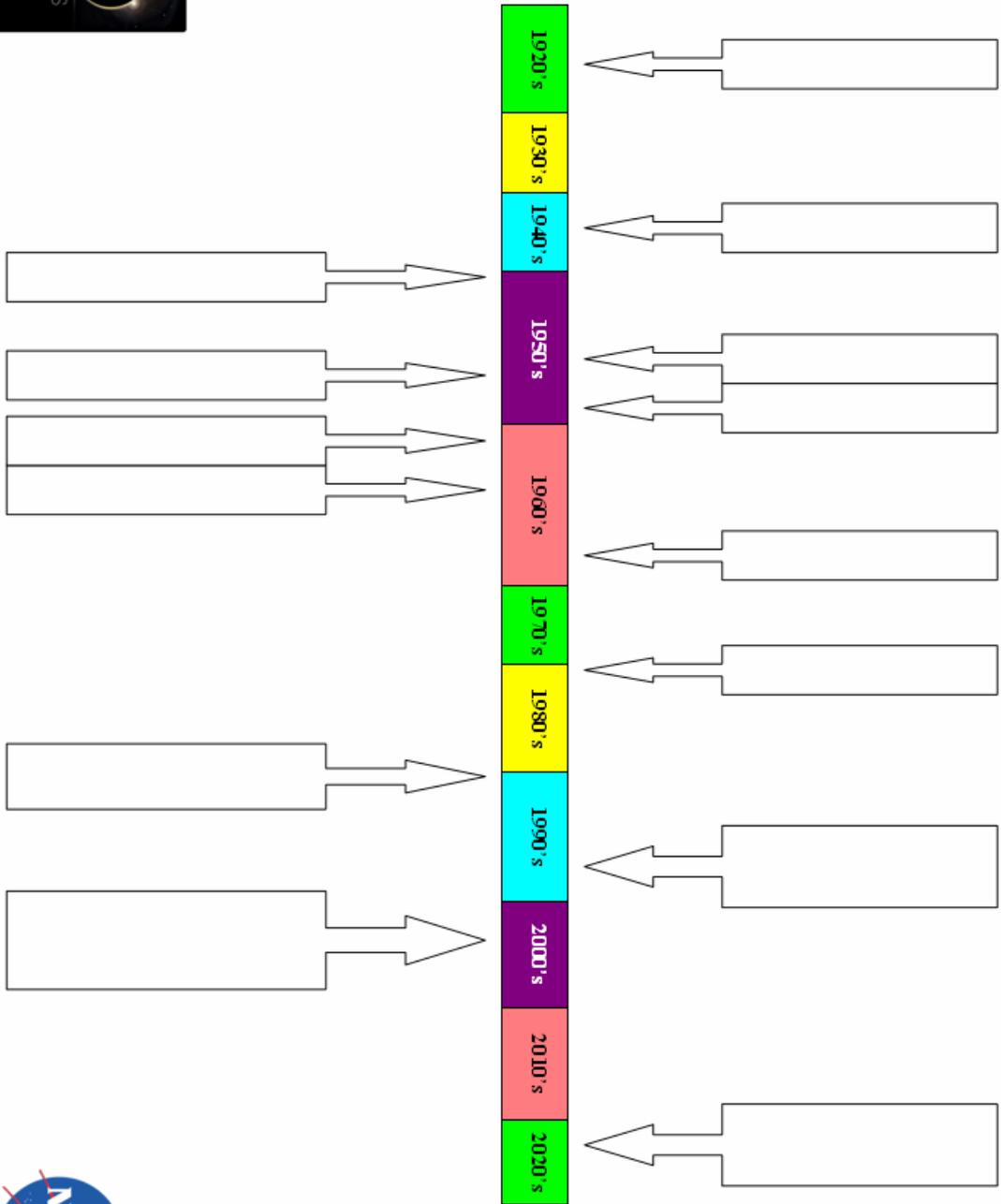
NASA History

Teacher Sheet



NASA History

Student Sheet





Activity #2

ESSAY QUESTIONS

* Students must carry out some research on their own to properly answer most of these essay questions.

1. How do you think the world would have been different if the Soviets continued their domination of space exploration during the 1950s and 1960s?
2. Make a poster that would encourage companies to invest in the exploration of space. Entice them by informing them that there are many resources in outer space that humans could potentially utilize on Earth.
3. Explain the pros and cons of a manned space flight program to a NASA administrator. Your final report should mention if you support or do not support a manned space flight program.
4. Give a NASA accountant your recommendation as to where funds should be allocated for the next 5 years (or 10, 15, or 25 years). (I.e. What portion of the NASA budget should be used to fund human and robotic space exploration?)
5. Design a healthy diet and exercise plan for an astronaut that would be living in microgravity for 6 months. Be sure that you list the amount of food the astronaut is supposed to eat as well as which exercises and for how long the astronaut must do them everyday. Include as much variety in your plan as you want to make sure the astronaut stays as healthy as possible.
6. Imagine yourself as a PR representative for NASA. How would you increase public interest about space exploration? Create promotional material (posters, brochures, etc) and give a presentation that explains why the public should increase their knowledge of space exploration.
7. Imagine yourself as an astronaut that is about to be trained to live aboard the ISS for 3 months. The astronauts that you will be living with are from various countries. At your first meeting, you must explain yourself to your crew and help them understand American culture. Give them a quick U.S. history lesson and explain to your fellow astronauts what the U.S. is looking to get out of its space program. *As a group activity, you may assign single students to the various countries that contribute to the ISS. Have them also give a quick history lesson of their country and what they are looking to get out of their own space program.*



Post-Conference

Online Post-Assessment

After the event, students will need to take this post-conference assessment. (These questions are the same questions used in the pre-assessment.) This short assessment will help you measure student learning and help us identify any changes that need to be made in future programs.

Post-Conference Assessment Questions

1. In what year was NASA created?
2. Who was the first American in space?
3. What was the name of the program that sent astronauts to the moon?
4. What was the name of America's first space station?
5. How is the space shuttle remarkable?
6. How has the Hubble Space telescope advanced our understanding of our solar system, galaxy, and universe?
7. How big is the International Space Station?
8. What are the names of the rovers that are currently exploring the Martian surface?
9. What is the main goal of Project Constellation?
10. What is the importance of building a lunar base?



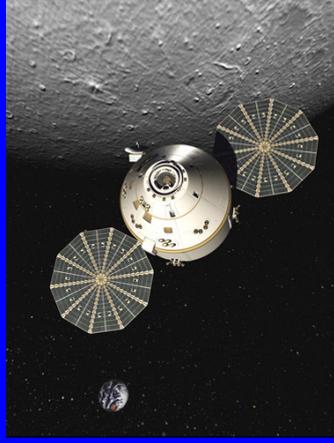
NASA Education Evaluation Information System (NEEIS)

Please complete an online evaluation form to provide feedback on the NASA Expedition.

Feedback from you and a few of your students would be appreciated.

<http://dln.nasa.gov/dln/content/feedback/>

NASA's Digital Learning Network



Presents this

Certificate of Completion

to

for

Discover NASA and You.



Vocabulary

Some of these terms are advanced. Please use only the words that you think are appropriate for your students.

Alan Shepard: The first American to go into outer space.

Altair: The newly named, yet to be developed craft that will land astronauts on the Moon.

Apollo Space Program: A NASA program that lasted between 1968-1972. The ultimate goal of the Apollo program was to land men on the moon. This was accomplished on July 20th, 1969.

Ares I and Ares V: The new generation rockets that are being developed for the next stage of space exploration. Ares 1 will carry astronauts while Ares V will carry heavier items into space.

Cold War: A period that lasted between 1945 to the late 1980's. The Cold War was a competition between the United States and the Soviet Union for supremacy in military and technological advancements. The Cold War was an uneasy time for the public as the threat of nuclear war was always present.

Constellation: The program responsible for developing and integrating all the technologies necessary to facilitate the next stage of space exploration. Current focus is to visit the Moon by 2020. The chief components of Constellation include the Ares I and V rockets, crew exploration vehicle named Orion, and the lunar lander Altair.

Edward White: The first American to conduct a spacewalk.

Gemini: NASA's second manned space program which lasted from 1965-1966. The main goal of Gemini was to send two men into space, spend more time in orbit, and rendezvous with other space crafts while in orbit.

Hubble Space Telescope: A large telescope in low earth orbit since 1990. It is designed to see much further into space than ground based telescopes. It has advanced our understanding of the solar system, neighboring galaxies, and deep space significantly.

International Space Station: A large space station in low earth orbit. The ISS is a peaceful coalition of 16 countries who have all contributed manpower and technology to build the ISS. It is a platform for conducting various experiments including how humans react to long-term exposure to microgravity.

Low Earth Orbit: Generally defined as an orbit within the area extending from 124-1240 miles above the Earth's surface. The ISS is in LEO.

Mercury: NASA's first manned space program which lasted from 1961-1963. The main goal of Mercury was to place a single astronaut in space, orbit the Earth, and safely return them to Earth.

Microgravity: The condition of near-weightlessness created by free fall. This condition is found aboard space crafts once they are in orbit around Earth.

Orion: The new spacecraft that will carry astronauts to the Moon and beyond. It is based on Apollo era theory combined with modern technology.

Outer Space: The environment surrounding planets, stars, galaxies, etc.

Oxidizer: A substance that oxidizes another substance, especially one that supports the combustion of fuel.

Robert Goddard: Considered the father of American rocketry, Robert Goddard experimented with the first liquid fueled rockets.

Rocket: A structure that propels itself vertically using the exhaust from burning gas.

Skylab: America's first space station. It lasted from 1973-1974 and led to many advancements in the understanding of how humans function in microgravity.

Space Shuttle: The world's first reusable space craft. It is able to launch like a rocket, maneuver like a space craft, and land on Earth like a glider.

Spirit and Opportunity: Robotic rovers that are currently exploring the surface of Mars. Their mission is to investigate Martian rocks and soil to learn more about the history of Mars.

Wernher von Braun: The German rocket scientist that was largely responsible for developing the rocket technology which NASA used for its manned spacecraft program in the 1960s and 1970s.



Resources

NASA

www.nasa.gov

NASA 50th anniversary

<http://www.nasa.gov/50th/home/index.html>

NASA Constellation Project

www.nasa.gov/constellation

The Vision for Space Exploration

<http://www.whitehouse.gov/infocus/space/>

http://www.whitehouse.gov/space/renewed_spirit.html



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