Dawn of the Space Age

Program Summary

From Sputnik to the Space Shuttle and beyond, join the excitement of exploring the final frontier. Behold the drive, passion, and perseverance of the men and women who dare to explore, as the world celebrates the 50th anniversary of the first human in Earth orbit and the 30th anniversary of the first Space Shuttle launch. With the advent of international cooperation and commercial spaceflight, we are experiencing the dawn of a new space age.

Tennessee Science Standards

See www.adventuresci.com to find specific Grade Level Expectations (GLE).
EMBEDDED TECHNOLOGY AND ENGINEERING
Conceptual Strand: *Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.*
PHYSICS / CONCEPTUAL PHYSICS STANDARD 1 – MECHANICS
Conceptual Strand 1: *Laws and properties of mechanics are the foundations of physics.*
STANDARD 6 – THE UNIVERSE
Conceptual Strand 6: *The cosmos is vast and explored well enough to know its basic structure and operational principles.*
STANDARD 11 – MOTION
Conceptual Strand 11: *Objects move in ways that can be observed, described, predicted, and measured.*
STANDARD 12 – FORCES IN NATURE
Conceptual Strand 12: *Everything in the universe exerts a gravitational force on everything else; there is interplay between magnetic fields and electrical currents.*

Objectives

1. Name at least one astronaut and describe what he or she did in space.
2. Name one spacecraft and describe its purpose and where it was used.
3. Describe two challenges of human spaceflight.

Pre-Visit Activities

1. The launch of Sputnik is usually seen as the beginning of the “Space Age.” Have students research the rocket science that led to Sputnik: early rocket pioneers, bombs from WWII, even as far back as Chinese fireworks.
2. Investigate how many humans have flown in space - including Russian and Chinese programs. Discover records for longest and shortest stays in space, most flights by one astronaut, most spacecraft flown by a single astronaut, longest astronaut career, most people in space at one time, how many different countries’ citizens have flown, etc.
3. Discover how many people, scientific disciplines, and companies it took to get Apollo 11 to the moon. Compare that to Space Shuttle and ISS support services. Research the companies who are developing new systems for commercial human spaceflight and tourism.

Post-Visit Activities

1. Download the monthly star chart from our website www.SudekumPlanetarium.com. Encourage students to locate the

Vocabulary

Agena
Alexei Leonov
Apollo
atmosphere
atmospheric pressure
command module
Deep Space Network
elliptical
freefall
Galileo
Gemini
Gravity
International Space Station
hydrogen
Kazakhstan
Laika
lunar module
maria
manned space program
Neil Armstrong
orbit
planet
radiation
Sergei Korolov
space race
Sputnik
Trans-lunar insertion
Venera
Viking 1 & 2
Vostok
Wernher von Braun
Yuri Gagarin

constellations and any planets visible in the evening sky.
2. Using our website list, have students find out when they can see ISS, iridium satellites, or other objects pass overhead. Encourage students to watch actual satellite passes outside.
3. Have students discover how many places on Earth can launch spacecraft. (There is more than just Cape Canaveral!) How many nations can launch humans into space? What are their plans for the future of human spaceflight?
4. How many different places can the Shuttle land? How many different crewed space stations have orbited Earth? Don't forget about Russian, Japanese, Chinese, Indian, . . .
5. The focus of this program is human spaceflight, but Earth-orbiting satellite technology is critical to our everyday lives. How many GPS satellites are there? How many weather satellites? Others? How often do they need to be replaced?
6. Have students explore the many hazards of spaceflight. Then consider dangerous things they do every day (travel on the interstate). Compare the odds of accidents on Earth to space.
7. Hold a debate on the usefulness of space exploration. How can information about other planets help us on Earth? What are the costs and risks? What benefits has the space program had on our everyday lives? Find out how others feel about this issue. Order the free NASA publication called Space Spinoffs about how space technology is used on Earth.

Exhibit Connections

Space Chase – Test Bed
Start at the **Rocket Launch** to see how rockets escape Earth's gravity. Move to **Trajectory Trails** to practice celestial mechanics. Explore the **Drop Tower** and **Spin Browser** to learn how objects behave in microgravity. These three exhibits together provide hands-on experience with Newton's Laws of Motion.

Students can practice moving outside a spacecraft on the **EVA wall**, or sit and try to use a tool on the **MicroG simulator chairs**.

The history of human spaceflight is graphically illustrated on the two-story **Test Bed wall mural**.

Resources

Websites

Monthly star charts and related articles - www.SudekumPlanetarium.com

Current ISS news and pictures: http://www.nasa.gov/mission_pages/station/main/index.html

The history of rockets since 100BC http://history.msfc.nasa.gov/rocketry/

NasaQuest rockets information http://quest.nasa.gov/space/teachers/rockets/history.html

Rocket Science 101 http://www.nasa.gov/externalflash/RocketScience101/RocketScience101.html

Weightlessness and the Human Body: http://www.medicine.mcgill.ca/mnmsmi/White%201998.pdf

ESA kids: Living in space: http://www.esa.int/esaKIDSen/SEM3ZRW797E_g.html

NASA Science http://nasascience.nasa.gov/

ISS and Satellite Flyovers: http://www.spaceweather.com/flybys/index.php?PHPSESSID=hci4dd94rcfmtj31v1u52h31v0

Books

Rocket Science (Apogee Books Space Series) by Alfred Zaehringer and Steve Whitfield

Space Exploration (DK Eyewitness Books) by Carole Stott

Amazing International Space Station, The by Editors of YES Mag

Space Shuttle: The First 20 Years -- The Astronauts' Experiences in Their Own Words by DK Publishing

Two Sides of the Moon: Our Story of the Cold War Space Race by David Scott and Alexei Leonov

October Skies by Homer Hickam