



## Astronomy: *Discussion Guide*

### Overview

Our knowledge of the universe has increased astronomically since Galileo Galilei peered through his telescope in 1609. From satellites to spacecraft, the technology of the past 50 years has provided remarkable views of our galaxy and the universe itself. And yet, so much remains unknown and unexplored.

To help your students understand their place in space, use this discussion guide and related videos and activities.

### Classroom Activities

1. Show the “Introduction to Our Solar System” and “The Planets of Our Solar System” segments from the *Earth Science: Solar System* video.
  - **Vocabulary:** The nine planets in our solar system are classified in a number of ways. Have students research the two most popular classification sets—terrestrial vs. Jovian, small vs. giant—and report their findings to the class.
  - **Travel Times:** In the first video segment, students learn that the Earth travels around the sun at 66,000 miles an hour. Have them calculate how long it would take to travel that same distance by car (60 miles an hour), by high-speed train (150 miles an hour), and by airplane (Boeing 747 travels at about 565 miles an hour).
  - **Planetary Posters:** Divide the class into nine groups and assign each a planet in our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto.) Have the groups research their planets and create a poster that contains images, basic information, and fun facts. Display the posters in a classroom exhibit, arranging the planets in their order from the sun.
2. Show the segment “Inside the Sun” from the *Strong Chemistry* video. (Access to *unitedstreaming* is required.)
  - **Pre-viewing Discussion:** Before showing the segment, tell students that weather exists in space and that scientists work to forecast it. Have them

speculate about the data, patterns, and events that are monitored. What types of weather do they think scientists are looking for? How might solar weather affect Earth?

- **Post-viewing Discussion:** After viewing the segment, discuss solar storms. What are sunspots and solar flares? What problems can solar storms cause here on Earth? How do scientists monitor and forecast them?
- **Science Investigation:** Have students visit the Space Weather Center (<http://www.spaceweathercenter.org/>) and review the Living with a Star and Storm Alert sections. Then challenge them to write and design a solar weather report that could appear in the newspaper.

3. Show the “Hubble Space Telescope” segment from the *Earth Science: Space Exploration* video. (Access to *unitedstreaming* is required.)

- **Discussion:** In the video, students learn about the space telescope’s namesake, Edwin Hubble. What contributions did he make to our understanding of the universe? What does it mean that our universe is expanding?
- **Science Investigation:** April 25, 2005, marked the 15th anniversary of the launch of the Hubble Space Telescope. Have students research and report on the many contributions to astronomy that can be credited to the new views of the universe the telescope has provided. (A good place to start is <http://hubblesite.org/discoveries/>.) You can have the students either write a brief report on their favorite discovery or create a Top 10 List.
- **Debate:** The final Hubble servicing mission, scheduled for 2006, was cancelled in January 2005 by then-NASA administrator Sean O’Keefe. No funding for the mission was included in the 2006 budget request released by the White House in February 2005. Both decisions have drawn considerable criticism and protest. During his congressional confirmation hearing on April 11, 2005, incoming NASA administrator Mike Griffin said, “We should reassess the earlier decision in light of what we learn after we return to flight.” Challenge students to research and debate whether the 2006 servicing mission should take place.

4. Show “The Space Shuttle” segment from the *Earth Science: Space Exploration* video. (Access to *unitedstreaming* is required.)

- **Discussion:** Of the space shuttle’s 113 missions to date, two have ended tragically. Do students think the missions are worth the risks? Why or why not? Would they be willing to travel aboard a space shuttle?
- **Vocabulary:** There are actually three systems in a space shuttle: the orbiter, external tank, and solid rocket boosters. Have students research the systems and write a definition for each.
- **Science Investigation:** After the 2003 Columbia accident, the space shuttle fleet was grounded while NASA spent more than two years

studying the disaster and making the shuttle safer. In May 2005, the space shuttle is scheduled to return to space. Have students explore NASA's Return to Flight coverage—either by viewing the Flash™ Feature at <http://www.nasa.gov/> or the HTML Web pages at <http://www.nasa.gov/returntoflight/main/index.html>—and report on the changes that have been made to the space shuttle system.

## Academic Standards

This discussion guide addresses the following national standards.

### National Academy of Sciences

<http://books.nap.edu/html/nses/html/overview.html#content>

- Earth and Space Science: Earth in the solar system, Origin and evolution of the Earth system
- Science and Technology: Abilities of technological design, Understanding about science and technology
- Science in Personal and Social Perspectives: Science and technology in society

### Mid-continent Research for Education and Learning (McREL)

<http://www.mcrel.org/compendium/browse.asp>

- Science
  - Earth and Space Sciences: Understands the composition and structure of the universe and the Earth's place in it
  - Nature of Science: Understands the nature of scientific knowledge, Understands the scientific enterprise
- Technology
  - Understands the nature of technological design, Understands the nature and uses of different forms of technology
- Language Arts
  - Writing: Uses grammatical and mechanical conventions in written compositions; Gathers and uses information for research purposes
  - Listening and Speaking: Uses listening and speaking strategies for different purposes
  - Viewing: Uses viewing skills and strategies to understand and interpret visual media