

- Ask students whether they think humans will ever set up a colony on any of the other planets in our solar system. Based on the information presented in the program, discuss with students what other planet they think would be best for humans to inhabit.
- According to the program, it would take astronauts some 12 years to reach Pluto, which means 24 years to complete a round trip back to Earth. Discuss with students whether such a trip is feasible, taking into account the oxygen, fuel and food that the astronauts would need to get there. Brainstorm about things we would have to invent to make a trip like this possible.

## Follow-up Activities

- "My Very Educated Mother Just Served Us Nine Pizzas" is a mnemonic device that many relied upon to remember the names of the planets and their order from the sun. Based on the 2006 reclassification of Pluto as a "dwarf planet," have students devise new mnemonic devices to remember the names and order of the eight planets.
- Have students research some of the technology humans have used to explore the solar system, reporting back to the class on probes such as the Venera and Voyager, the Hubble Space Telescope and the Sojourner rover used on Mars.
- Have students map out a display showing the relative distances between planets for a better understanding of the distances involved. Have them label markers for the planets and the distance in between, being sure to also mark the asteroid belt and any moons.
- Someday, taking a trip to Mars will be someone's idea of a great summer vacation. Have students create promotional pamphlets and posters for their favorite planets, designed to entice tourists to vacation there, basing all information on actual facts about that planet.
- In groups, have students select a planet and generate a fictionalized plan for colonization, taking into account what people would need to live comfortably away from the Earth and on their specific planet.

## Suggested Internet Resources

Periodically, Internet Resources are updated on our web site at [www.LibraryVideo.com](http://www.LibraryVideo.com).

- [starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html](http://starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html)  
NASA's "StarChild" site is a great place for young astronomers to gain important information on the solar system.
- [amazing-space.stsci.edu/trading-top-level.html](http://amazing-space.stsci.edu/trading-top-level.html)  
"Solar System Trading Cards" provides students with a fun matching game to help them learn about the objects in our solar system, while teachers can browse informative tips and links.

(Continued)

- [science.hq.nasa.gov/kids/](http://science.hq.nasa.gov/kids/)  
This portion of the "NASA Kids" site offers informative briefs of the Earth, the moon and other objects in our solar system.
- [seds.lpl.arizona.edu/nineplanets/nineplanets/](http://seds.lpl.arizona.edu/nineplanets/nineplanets/)  
The "Eight Planets" is a multimedia tour of the solar system, featuring the history, mythology and current scientific knowledge of each of the planets and their moons.
- [pds.jpl.nasa.gov/planets/](http://pds.jpl.nasa.gov/planets/)  
"Welcome to the Planets" presents some of the best images from NASA's planetary exploration program along with detailed information on the planets and the space probes used.

## Suggested Print Resources

- Ride, Sally and Tam O'Shaughnessy. *Exploring Our Solar System*. Crown Books for Young Readers, New York, NY; 2003.
- Simon, Seymour. *Destination: Jupiter*. HarperTrophy, New York, NY; 2000.
- Simon, Seymour. *Destination: Mars*. HarperTrophy, New York, NY; 2004.
- Simon, Seymour. *Mercury*. HarperTrophy, New York, NY; 1998.
- Simon, Seymour. *Venus*. HarperTrophy, New York, NY; 1998.

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### TITLES

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|-----------------------|-------------------------|
| • ALL ABOUT STARS     | • ALL ABOUT THE PLANETS |
| • ALL ABOUT THE EARTH | • ALL ABOUT THE SUN     |
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## All About The Planets

Grades K-4

This guide is a supplement, designed for teachers to use when presenting the program *Space Science For Children: All About The Planets*.

**Before Viewing:** Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create a "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they had put on their list were scientifically accurate.

**After Viewing:** After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts they that put had on their "Everything We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



## Program Summary

The Earth and its moon are part of a solar system that includes planets, moons and other objects that orbit the sun. Our solar system contains nine planets. Mercury, Venus, Earth and Mars are known as the inner planets, which are all rocky and solid. A great distance — not to mention a heavily populated asteroid belt — separates them from the five outer planets. Jupiter, Saturn, Uranus and Neptune are gas planets while Pluto, the planet farthest from the sun, is solid. While astronauts have traveled to the Earth's moon, none have journeyed to the other planets, leaving that task to unmanned space probes and rovers. These high-tech space exploration tools collect data, specimens and photographs, all of which have shown that the other planets in the solar system are very different from Earth.

Note: On Thursday, August 24, 2006, over 2,500 astronomers from around the world met in Prague to vote on guidelines that determined that Pluto was not a planet in the classic sense, because its orbit overlapped that of Neptune. Instead, Pluto was reclassified as a "dwarf planet."

## Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

**Mercury** — The first planet from the sun is a deserted ball of rock that resembles the Earth's moon, containing no oxygen and a thin atmosphere.

**Venus** — The second planet from the sun is the hottest in the solar system, featuring a solid, rocky surface with volcanoes and channels surrounded by a thick, toxic atmosphere.

**Earth** — The third planet from the sun is our home and features a breathable atmosphere containing oxygen, large amounts of liquid water and a range of temperatures suitable for sustaining life.

**Mars** — The fourth planet from the sun is known as the "red planet" because the soil contains iron oxide (rust), which is often blown into the air, giving the sky a reddish pink appearance.

**Jupiter** — The fifth planet from the sun is the largest in the solar system, comprised of gases and liquids, and features very severe weather. Also known for the Great Red Spot, a wind storm that is three times the size of the Earth.

**Saturn** — The sixth planet from the sun is a gas planet with 21 moons. Best known for its large rings made of icy chunks.

**Uranus** — The seventh planet from the sun is a gas planet with smaller and darker rings than those of neighboring Saturn.

**Neptune** — The eighth planet from the sun is an extremely windy and cold planet that is colored blue by its gases.

**Pluto** — Once known as the ninth planet from the sun, Pluto was reclassified as a "dwarf planet" in August 2006, because its orbit overlapped that of Neptune. This solid, rocky dwarf planet would take 12 years to reach if traveling from Earth.

**planet** — A large body of solid rock, liquid or gas that revolves around the sun on a clear orbit.

**space shuttle** — NASA's reusable space vehicles that lift off from Florida's Cape Canaveral powered by large rockets. *(Continued)*

**astronauts** — Men and women who travel to space in rocket-powered vehicles to study the solar system.

**probes** — Unmanned vehicles and/or instruments sent into space to collect samples or take photos, used to explore areas where astronauts cannot travel.

**solar system** — The sun, the nine planets and their moons, as well as other objects that orbit the sun.

**Venera** — A series of unmanned Russian probes launched to study and take photos of Venus.

**oxygen** — The gas in the Earth's atmosphere which all animals breathe in order to survive.

**Sojourner** — A remote American mini-rover used to explore Mars in 1997.

**inner planets** — Name given to Mercury, Venus, Earth and Mars, all of which are similar in size, substance and shape. A great distance separates them from the five outer planets.

**asteroids** — Odd-shaped rock and/or metal pieces which orbit the sun, varying in size from small enough to hold to big enough to land on. There are approximately one million asteroids that orbit the sun in a belt between the inner and outer planets.

**outer planets** — Name given to Jupiter, Saturn, Uranus, and Neptune, all of which are made up of liquids and gases. A great distance separates them from the four inner planets.

**Voyager** — Either of a pair of unmanned American probes launched to observe and transmit to Earth information about the outer planets.

**Hubble Space Telescope** — The large orbiting American telescope that provides us with the clearest view of outer space.

**orbit** — The continuous path of an object around another body; the moon orbits the Earth, as the Earth and the other planets orbit the sun.

**Ptolemy (tol' em- e)** — A Greek astronomer who believed that the Earth was the center of the universe.

**Copernicus** — A Polish astronomer who discovered that the sun was the center of the solar system.

**atmosphere** — The layers of gases that surround a planet.

## Pre-viewing Questions

Before students generate their list of "Everything We Know About..." this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

1. What is a solar system?
2. How many planets are there in our solar system and what are their names?
3. What are some characteristics of the Earth that makes our planet different from others?
4. Besides planets, what other bodies can be found in the solar system?
5. What planet is farthest from the sun? How long do you think it would take to travel to that planet? *(Continued)*

After the class has completed their "Everything We Know About..." list, and before watching the show, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

## Focus Questions

The key questions raised in this program, and answered during the "Mission Report," are as follows:

1. What is a planet?
2. Do planets move?
3. Could there be life out there?
4. Which planet is full of water, has lots of oxygen and has a moderate temperature range?

Other questions you may wish to ask your class to assess their comprehension of additional points presented in this show are as follows:

1. What objects can be found in our solar system?
2. What is the sun? How big is it compared to the planets?
3. Why is the sun important to our solar system?
4. Starting at the sun, what are the names of the planets in order?
5. Which planet looks like the Earth's moon?
6. If Mercury is the closest planet to the sun, why is Venus the hottest?
7. Several planets have an atmosphere. Why is Earth's atmosphere the only one that can support life like ours?
8. Why is Mars called the "red planet"?
9. What is found between the inner and outer planets?
10. Why have we sent probes instead of astronauts to explore the distant areas of the solar system?
11. What is the main reason we could not land on outer planets?
12. What is the Great Red Spot?
13. How long would it take us to travel to Pluto?

## Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their "Everything We Know About..." list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised before reviewing the program.

Raising a thought-provoking question is a good way to assess the overall depth of understanding. A couple of suggestions are listed below:

- Discuss with the class the reasons why men such as the Greek astronomer Ptolemy believed that the Earth was the center of the universe. Think about this in relation to the recent labeling of Pluto as a "dwarf planet." How has technology and dialogue helped to shape and reshape our view of the universe? *(Continued)*