Earth Science: Solar System
Teacher's Guide

Grade Level: 6–8	**Curriculum Focus:** Earth Science	**Lesson Duration:** 2–3 class periods

Program Description

Welcome to the star and nine planets of our neighborhood, the solar system. Formed 4.5 billion years ago, it was made from dust and gas remnants of the big bang. Just one of billions of stars in our galaxy, the sun's gravitational pull holds the planets, comets, meteors, and asteroids in orbit. This "ordinary" star produces the heat and light that make life on Earth possible. The sun will live a life of about 10 billion years before expanding and then contracting to become a white dwarf. Larger stars' life cycles are more dramatic. They may go supernova and even form black holes, vast expanses where gravity is so strong that not even light can escape.

Discussion Questions

- How old is the solar system, and how was it formed?
- Describe the process of star and solar system formation after the Big Bang.
- Name the four terrestrial planets, the four gas giants, and the outermost known planet of our solar system.
- Describe how the sun is like a giant nuclear reactor.
- What is a comet, and why do comets have tails?
- What is a meteor, and how is it different from a meteorite? What is a very large space rock called?
- Describe the life cycle for small, medium, and large stars. What can become of very large stars when they die?

Lesson Plan

Student Objectives

- Understand the makeup of the solar system and how it was formed.
- Become familiar with the sun, planets, and moons of the solar system.
- Write classified ads describing conditions on our solar system's planets, moons, and star.

Materials

- Computer with Internet access
- Print resources about the solar system

Procedures

1. Your students are going to become realtors to the stars—well one star, anyway, our own sun as well as the other choice pieces of real estate in the solar system. As such, it's their job to find out about these exciting places and write up a convincing ad to describe them to potential buyers. To get them started, assign each student a solar system "property": the sun, one of the eight planets besides Earth, Earth's moon, or one of the many moons orbiting Jupiter, Saturn, or one of the other planets. There's more information about some of the moons than others, so a quick visit to the Nine Planets site at http://www.nineplanets.org can help you determine which ones you might want to assign.
2. Students will need to conduct research to find out the following information, which should be worked into each ad:
    - The object's place in the solar system (i.e., how far from the sun and Earth)
    - What conditions might be like on the surface (temperature, weather, atmosphere, land, no land, length of day, etc.)
    - Special features or other interesting facts, such as what you might weigh on the surface of the planet or moon
    - An image of the "property"

    Encourage students to be creative. They can look up real estate ads in your local newspaper to get ideas about how to write their own.
3. Here are some Web sites that offer good information about the objects in our solar system:
    - BBC's Solar System page

      http://www.bbc.co.uk/science/space/solarsystem/index.shtml
    - KidsAstronomy's Solar System

      http://www.kidsastronomy.com/solar_system.htm
    - NASA's Jet Propulsion Laboratory page Solar System

      http://www.jpl.nasa.gov/solar_system/
    - The Planetary Society's Planetary News page

      http://www.planetary.org/html/what-is-new.html
4. Combine all the finished ads into a special solar system circular. You can divide the ads into sections for "Promising Planets," "Moons Not to Miss," and a "Stellar Address" (the sun). Print up copies of the circular so that each student can have a copy to read.

5. Review by having each student comb through the ads to find answers to these questions:
    - What is the largest moon listed? The smallest?
    - What planet or moon is the coldest? The hottest?
    - What planets or moons might be good places to look for life?
    - What planets or moons are believed to have water?
    - Which planet has the longest day? The longest year?
    - Which planets or moons have atmospheres?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students were highly engaged in class discussions; conducted thorough research and wrote a creative ad including all the required information; answered the review questions accurately.
- **2 points:** Students participated in class discussions; conducted research and wrote a good ad including most of the required information; answered most of the review questions accurately.
- **1 point:** Students participated minimally in class discussions; conducted minimal research and wrote a brief ad including little of the required information; answered few of the review questions accurately.

Vocabulary

asteroid

Definition: A space rock orbiting the sun that may be a few meters across or up to hundreds of kilometers in size

Context: Most asteroids are found orbiting between Mars and Jupiter.

big bang

Definition: Theory of the creation of the universe in which one tiny point of mass exploded

Context: Since the Big Bang about 20 million years ago, the universe has been expanding.

black hole

Definition: Area in space with gravity so strong that even light cannot escape

Context: When very large stars die, they may form black holes.

comet

Definition: Ball of ice, dust, and gases that leave behind a visible trail when close enough to the sun

Context: When a comet passes close enough to the sun, it begins to melt, leaving what looks like a "tail" behind it.

gravity

Definition: Natural force of attraction between all masses

Context: The more massive a space object, the more gravity it exerts on other objects.

meteor

Definition: Bright light trail given off as a space rock (meteoroid) burns up in Earth's atmosphere

Context: A meteor is also called a shooting star.

meteorite

Definition: A space rock that survives Earth's atmosphere to reach the surface

Context: Meteorites from Mars may provide clues to possible life there.

supernova

Definition: Explosion of a large star that emits tremendous energy

Context: After large stars go supernova, they may form black holes.

white dwarf

Definition: Small, dense remnant of a dead star

Context: When medium sized stars die, they may become white dwarfs.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K–12. To view the standards, visit this Web site:

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

This lesson plan addresses the following national standards:

- Earth and Space Science: Earth in the solar system

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K–12 Education addresses 14 content areas. To view the standards and benchmarks, visit http://www.mcrel.org/compendium/browse.asp

This lesson plan addresses the following national standards:

- Science: Earth and Space Sciences—Understands composition and structure of the universe and Earth's place in it
- Language Arts: Viewing—Uses viewing skills and strategies to understand and interpret visual media; Writing—Uses the general skills and strategies of the writing process, Gathers and uses information for research purposes; Reading—Uses reading skills and strategies to understand and interpret a variety of informational texts

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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- http://school.discovery.com/teachingtools/teachingtools.html

Also find more Discovery lesson plans related to this activity at the Lesson Plan Library:

- http://school.discovery.com/lessonplans/

On the main Library page, choose your grade level and select "Astronomy/Space" from the pull-down menu to bring up a large selection of activities.
