

The Story of the Solar System: Teacher's Guide

Grade Level: 3-5

Curriculum Focus: Earth and Space

Lesson Duration: 2-3 class periods

Program Description

Formation of the Solar System (5:17) Learn how galaxies came together. *Solar Energy and Wind (5:12)* Witness the power contained in the sun's energy and wind. *The Planets (5:01)* Go from Mercury to Pluto as you travel the planets. *Orbiting the Sun (5:08)* Examine the role comets and asteroids play in the night sky.

Onscreen Questions

- What is a galaxy?
 - What is a light year?
 - How can Earth support life as we know it?
 - How does the Sun produce energy?
 - How does solar wind affect Earth?
 - What do you know about the planets?
 - What are the inner and outer planets?
 - Why is Pluto considered a planet?
 - How is Jupiter different from Earth?
 - In addition to stars, what objects may be visible in the night sky?
 - What are the differences between comets, asteroids, and meteoroids?
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Lesson Plan

Student Objectives

- Demonstrate an understanding that there are objects other than our Sun and the planets in our solar system;
- Identify and describe characteristics of an asteroid;

- Identify and describe characteristics of a meteoroid; and,
- Identify and describe characteristics of a comet

Materials

- *The Story of the Solar System* video and VCR, or DVD and DVD player
- Poster board, 1 per student group
- Crayons, markers, or colored pencils
- Tape or glue
- Black pens
- Index cards
- Pencils and erasers
- Encyclopedias, science texts, magazines, and other print resources with information about comets, asteroids, and meteoroids (and/or meteors and meteorites)
- Photos and images of comets, asteroids, and meteoroids (and/or meteors and meteorites)
- Computer with Internet access (optional)

Procedures

1. Talk about the night sky. What kinds of objects do we see in the night sky? What kinds of things exist in our galaxy? In our solar system? Have the class watch *The Story of the Solar System* to learn more about the Milky Way galaxy and our solar system.
2. After watching the program, review the information students learned about the objects in our galaxy and solar system. What did you learn about our solar system? What kinds of objects orbit the Sun or the planets? What are the smaller celestial bodies found in space? Ask students to talk about some of the facts or information they know or have learned from the program about asteroids, comets, and meteoroids (and/or meteors and meteorites).
3. Divide the class into groups of 4-5 and tell them that they are going to be making poster presentations for the rest of the class. Give them the option of researching asteroids, comets, or meteoroids (including meteors and meteorites) for their presentations. Tell the groups that they are to make posters with drawings and/or cut out or photocopied images of the celestial objects they are researching. Each poster must include 10 interesting facts about the object in a visible spot on the poster. The posters should be colorful and creative. Along with each poster, the groups are to prepare a 2-3 minute presentation about the object they researched. The presentations need to address the following questions:
 - What is the celestial object researched?
 - What does this celestial object look like?
 - How big or small can this celestial object be?



- When and how did we discover this celestial object's presence in our solar system?
 - Where in the galaxy is this celestial object typically found and/or how can we detect this object in the night sky?
 - How does this celestial object affect life on Earth?
4. Discuss ways the groups can divide up the presentation tasks. For example, perhaps one person in a group could be the interesting fact researcher, another person could find or draw images, two more students could write the presentation, and the final person in a group could be the oral presenter. Allow groups to divide their tasks however they see fit but make sure that all students are participating in some way. Give students time in class to research their presentations and make their posters. Students may use encyclopedias, astronomy texts, magazines, and other print sources to research their reports. The following Web sites also have good information on comets, meteoroids, and asteroids:

<http://spacelink.nasa.gov/Instructional.Materials/Curriculum.Support/Space.Science/Our.Solar.System/Small.Bodies/Comets.Asteroids.and.Meteoroids>

<http://www.solarviews.com//eng/homepage.htm>

<http://library.thinkquest.org/27930/asteroids.htm>

<http://encke.jpl.nasa.gov/>

<http://www.planetary.org/html/neo/Objects-Impacts/index.html>

<http://www.windows.ucar.edu/tour/link=/comets/comets.html&edu=high>

http://www.windows.ucar.edu/tour/link=/our_solar_system/asteroids.html

5. Once students have finished their research, have each group orally present their posters and reports to the rest of the class. Allow time after each presentation for questions.
6. After the presentations are finished, review what students now know about the smaller celestial bodies in our solar system. What were some interesting facts they discovered while researching their reports? What are some interesting things they learned from other group presentations?
7. Display the group posters in the classroom so that student may examine them in detail at their own leisure.

Assessment

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

- **3 points:** Students were highly engaged in class discussions; worked extremely well in their research groups; produced colorful and creative posters that identified at least 10 interesting facts about the celestial body they researched; and presented a complete 2-3 minute report that correctly addressed the set criteria.
- **2 points:** Students were engaged in class discussions; worked well in their research groups; produced somewhat colorful and creative posters that identified at least 8 interesting facts

about the celestial body they researched; and presented a 1-2 minute report that correctly addressed most of the set criteria.

- **1 point:** Students participated minimally in class discussions; were unable to work in their research groups without outside assistance; produced unfinished or nondescript posters that identified 5 or fewer interesting facts about the celestial body they researched; and presented an incoherent, incomplete report that did not address the set criteria.

Vocabulary

Solar system

Definition: The sun together with the nine planets and all other celestial bodies that orbit the sun.

Context: But the actual edge of the solar system is some 50 miles away in the Oort cloud.

orbit

Definition: The path of a celestial body or an artificial satellite as it revolves around another body.

Context: Sometimes Pluto's orbit brings it closer to the Sun than Neptune.

comet

Definition: A celestial body, observed only in that part of its orbit that is relatively close to the sun, having a head consisting of a solid nucleus surrounded by a nebulous coma up to 2.4 million kilometers (1.5 million miles) in diameter and an elongated curved vapor tail arising from the coma when sufficiently close to the sun

Context: In early 1997, comet Hale Bop came close enough to Earth to be seen with the naked eye.

coma

Definition: The nebulous luminescent cloud containing the nucleus and constituting the major portion of the head of a comet

Context: The gasses carry dust particles and surround the nucleus, forming a part called the coma.

asteroids

Definition: Any of numerous small celestial bodies that revolve around the sun, with orbits lying chiefly between Mars and Jupiter and characteristic diameters between a few and several hundred kilometers

Context: About 95% of asteroids travel in fairly circular orbits around the Sun.

meteoroid



Definition: A solid body, moving in space, that is smaller than an asteroid and at least as large as a speck of dust.

Context: The part of the meteoroid that doesn't burn and falls to Earth is called a meteorite.

Academic Standards

National Academy of Sciences

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. 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: Objects in the sky; Changes in earth and sky; Earth in the solar system
- Physical Science: Properties of objects and materials
- History and Nature of Science: Science as a human endeavor; Nature of scientific knowledge

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 Science: Understands the composition and structure of the universe and the Earth's place in it
- Nature of Science: Understands the nature of scientific knowledge
- Language Arts – Viewing: Uses viewing skills and strategies to understand and interpret visual media; Reading: Uses reading skills and strategies to understand and interpret a variety of informational texts

National Council for the Social Studies

The National Council for the Social Studies (NCSS) has developed national standards to provide guidelines for teaching social studies. To view the standards online, go to

<http://www.socialstudies.org/standards/strands/>.

This lesson plan addresses the following strands:

- Science, Technology, and Society

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>
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DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How To Use the DVD

The DVD starting screen has the following options:

Play Video – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index – Here the video is divided into four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief descriptions and total running times are noted for each part. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

Curriculum Units – These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher's Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.

Standards Link – Selecting this option displays a single screen that lists the national academic standards the video addresses.

Teacher Resources – This screen gives the technical support number and Web site address.

Video Index

Curriculum Units

