YOUR PLACE IN SPACE

Subject Matter: Science
Grade Levels: 3-5, but may be adapted for other grade levels
Time Allotment: Two 40-minute class sessions
Master Teacher: Christine Barr

Overview

How does your place in space affect you? Through activities presented in this lesson, students will gain an understanding of the solar system and how a planet's location, gravity, rotation and orbit affect its characteristics.

Learning Objectives

Students will be able to:

- Define the term gravity.
- Describe how gravity affects weight.
- Understand the Earth's (and other planets') place in the solar system.
- Recognize how the rotation of planets produces the night-and-day cycle.
- Define the term "orbit."
- Understand how orbit and rotation affect the planets' characteristics (temperature and gravity).

Oregon Standards Available at:

http://www.ode.state.or.us/cifs

Science - Earth and Space Science

- Describe the Earth's place in the solar system and the patterns of movement of objects within the solar system using pictorial models.

Media Components

Video

Check the link at http://www.opb.org/edmedia/trs/ to find access to the video(s) from unitedstreaming™ referenced in this lesson plan.

- "The Sky Above: A First Look" (17:00)
  - **Clip:** "Our Solar System: Earth and Gravity" (00:41)

- **Clip:** "Our Solar System: The Nine Planets" (01:19)
- "Junior Space Scientist: Our Solar System" (09:33)

Web

- **Space Kids: Planet Pounds**
  This is an interactive site that features a virtual scale. You are encouraged to enter your "Earth weight," then click on another planet to display your weight on that planet. If you click the "why" button at the bottom of the page, you are given an explanation as to how the pull of gravity affects your weight.
  http://www.spacekids.com/playanddo/ppounds/index.htm

- **Space Kids: Space Age**
  This is an interactive site that calculates your age on the other planets. If you click the "why" button at the bottom of the page, you are given a detailed explanation of how a planet's orbit and rotation affect the length of the year and day.
  http://www.spacekids.com/playanddo/spaceage/index.htm

- **EnchantedLearning.com: The Planets**
  This site features detailed facts about the solar system and planets. It includes a chart of the relative sizes of the planets and sun. The site also has graphs of temperature, density, mass, gravity, day in length and orbital velocity of the planets.
  http://www.enchantedlearning.com/subjects/astronomy/planets/

- **EnchantedLearning.com: Label the Solar System Printable Diagram**
  This printable diagram describes the location of planets in the solar system. Students must use the description to label the planets on the diagram.
  http://www.enchantedlearning.com/subjects/astronomy/activities/label/labelsolarsystem.shtml

Materials

For Each Student:

- A printable diagram of the solar system available at http://www.enchantedlearning.com/subjects/astronomy/activities/label/labelsolarsystem.shtml
- 2 sheets of graph paper
- Colored pencils

For the Class:

- Butcher paper to make a chart of planet facts

Prep for Teachers

Prior to teaching this lesson, bookmark all the Web sites used in the lesson on each computer in your classroom.

Download the video clips onto the computer you will use to project the clips for the classroom presentation. Be certain each computer in the classroom has a copy of the free Windows Media Player installed (some clips aren't available for use with QuickTime Player).

Make enough copies of the printable diagram of the solar system for each student in your classroom.

Make a butcher paper chart listing the names of the nine planets down one side and the following categories across the top: size, temperature, length of orbit, speed of rotation.

When using media, provide students with a **Focus for Media Interaction**, a specific task to complete and/or information to identify during or after viewing of video segments, Web sites or other multimedia elements.

Introductory Activity

Step 1: Ask students to name the planet on which we live. (Students will say that we live on Earth.) Ask students, "How long is one day on Earth?" (Students should recognize that one day is 24 hours long.) Discuss with students why an Earth day is 24 hours long. (Explain to students that an Earth day is how long it takes the Earth to rotate on its axis.) Ask students, "How many days are in an Earth year?" (If students cannot answer this, explain that there are 365 days in a year.) Tell the students that an Earth year is how long it takes the earth to orbit, or go around, the sun.

Step 2: Ask students to predict how long a day and year are on other planets. (Predictions will vary.) Write predictions on the board or overhead. Explain to the students that different planets have different lengths of day and year based on their rotation and orbit.

Step 3: Ask students to predict other characteristics of the planets that might be different from Earth. (Answers will vary, but may include temperature, seasons and gravity.) Explain to the students that in this lesson they will be examining the planets of the solar system and how they are affected by their place in space.

Learning Activities

Step 1: Explain to the students that they will be examining the characteristics of the solar system by watching video clips. Provide students with a **Focus for Media Interaction**, asking them to listen for a definition of gravity. **Play** the video clip, "Our Solar System: Earth and Gravity" (00:41), from the video, "The Sky Above: A First Look" (17:00).

Ask students to recall the definition of gravity. (Students should say that gravity is a force from the sun that keeps Earth in orbit.) Discuss with students why gravity is important. (Gravity keeps the Earth from floating away from the sun, gravity keeps things on Earth from floating around.)

Step 2: Tell students they are going to watch another video clip to learn about the other planets in the solar system. Provide students with a **Focus for Media Interaction**, asking them to listen for special features of the other planets. **Play** the video clip, "Our Solar System: The Nine Planets" (01:19), from the video, "The Sky Above: A First Look" (17:00). Ask students to recall special features of the other planets. (Answers will vary, but may include the following: Mercury and Venus are hot, Earth is blue from oceans, Mars is red, Jupiter is the largest planet, Saturn and Uranus have rings, Neptune is cold and Pluto is the smallest planet.) Make a chart on the board, or on butcher paper, showing the characteristics of the other planets.

Step 3: Tell students they are going to watch one more video that tells more detailed facts about the planets. Provide students with a **Focus for Media Interaction**, asking them to watch for facts about each planet's size, temperature, length of orbit and speed of rotation. **Play** the video, "Junior Space Scientist: Our Solar System" (09:33).

Pause the video when you hear, "… Some planets are so close to the sun that they get hot." Discuss with the students the Earth's size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

Pause the video when you hear, "… after Mercury comes Venus." Discuss with the students Mercury's size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

Pause the video when you hear, "… Earth is next in line from the sun, then Mars." Discuss with the students Venus' size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

Pause the video when you hear, "… Jupiter comes after Mars." Discuss with the students Mars' size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

Pause the video when you hear, "… Saturn has the brightest of them all." Discuss with the students Jupiter's size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

Pause the video when you hear, "… Uranus comes after Saturn." Discuss with the students Saturn's size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

Pause the video when you hear, "… after Uranus comes Neptune." Discuss with the students Uranus' size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

Pause the video when you hear, "… finally there's little, old Pluto." Discuss with the students Neptune's size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart. **Resume** the video.

When the video has ended, discuss with the students Pluto's size, temperature, length of orbit and speed of rotation. Fill in this information on the butcher paper chart.

Step 4: Have students complete the printable diagram of the solar system available at http://www.enchantedlearning.com/subjects/astronomy/activities/label/labelsolarsystem.shtml. Ask them to write a paragraph on the back of the sheet explaining how a planet's location affects its characteristics.

Culminating Activity

Step 1: Review with the students the planet facts on the butcher paper chart. Provide students with a **Focus for Media Interaction** by asking them to think of all of the ways in which the planets are different. Have students log on to the EnchantedLearning.com: The Planets Web site at http://www.enchantedlearning.com/subjects/astronomy/planets/ and study the graphs of temperature, density, mass, gravity, day in length and orbital velocity. Explain to the students that they will be completing a graphing project similar to these.

Step 2: Hand out two sheets of graph paper and colored pencils to each student. Explain to students that they are going to complete one graph of their space age and one graph of their weight in space.

Step 3: Have students log on to the Space Kids: Space Age Activity at http://www.spacekids.com/playanddo/spaceage/index.htm. Provide students with a **Focus for Media Interaction** by asking them to think about what would make their age different on each planet. Tell students that their graphs should display their age on all of the planets. On the back of their graphs, tell students they need to write an explanation as to why they have a different space age for each planet.

Step 4: Have students log on to the Space Kids: Planet Pounds Activity at http://www.spacekids.com/playanddo/ppounds/index.htm. Provide students with a **Focus for Media Interaction** by asking them to think about what would make their weight different on each planet. Tell students that they will make a graph that displays how weight varies from planet to planet. Students may choose any weight as a standard (some students may not be comfortable assessing their true weight). Tell students they need to write an explanation on the back of their graphs as to why they have a different weight for each planet.

Cross-Curricular Extensions

Art

- Have students create space paintings using black construction paper as a background.

Language Arts/Writing

- Have students write similes and metaphors using the planets. For example, they could say: "… is as red as Mars" or "… is like Mercury's heat" or "… is Pluto, far, far away."

Mathematics

- Have students figure out a scale model of the solar system.

Social Science

- Ask students to create timelines that highlight astronomical discoveries about our solar system alongside important historical events.

Community Connections

- Have students watch the moon every night for one week and sketch the changes they see.
- Take a class trip to a planetarium.
- Chart changes in sunrise and sunset.