



Lesson Title

What Influences Planetary Weather?

LESSON DESCRIPTION

This lesson combines a series of activities together to provide students with an understanding of the dynamics of weather on planets.

OBJECTIVES

Students will:

- Create a simulation to model how the principles of the Coriolis Effect influence weather patterns on a planet with gaseous atmospheres.
- Research the characteristics of what makes a planet habitable by engaging in a web-based interactive game.

NASA SUMMER OF INNOVATION

UNIT

Earth and Space Science

GRADE LEVELS

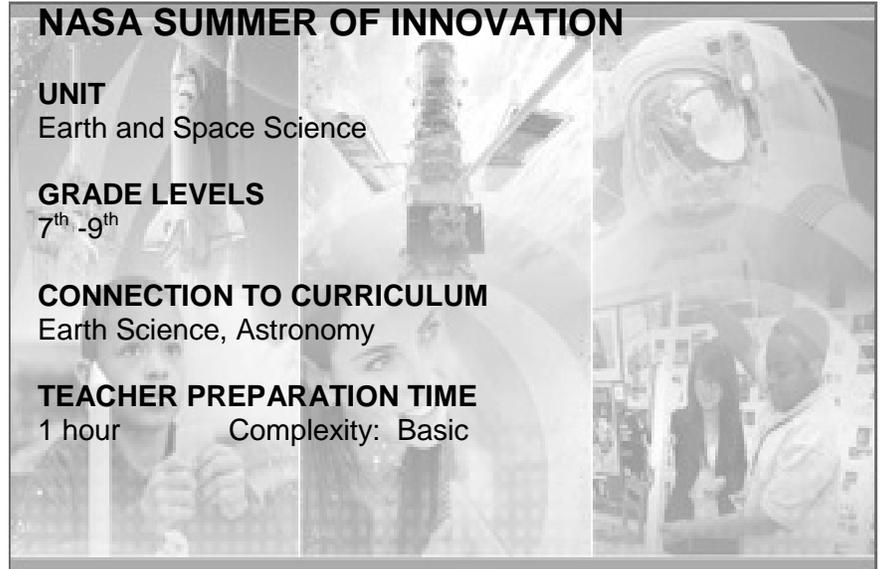
7th -9th

CONNECTION TO CURRICULUM

Earth Science, Astronomy

TEACHER PREPARATION TIME

1 hour Complexity: Basic



NATIONAL STANDARDS

National Science Education Standards (NSTA)

Earth and Space Science

- Origin and evolution of the earth system
- Structure of the earth system
- Earth in the solar system

History and Nature of Science

- Science as a human endeavor

Common Core State Mathematics Standards(NCTM)

Ratios and Proportional Relationships

- Analyze proportional relationships and use them to solve real-world and mathematical problems

Expressions and Equations

- Understand the connections between proportional relationships, lines, and linear equations

U.S. National Geography Standards (NCGE)

The world in spatial terms

- How to use mental maps to organize information about people, places, and environments in a spatial context.

The ISTE NETS and Performance Indicators for Students (ISTE)

Creativity and Innovation

- Apply existing knowledge to generate new ideas, products, or processes

Critical Thinking, Problem Solving, and Decision Making

- Use multiple processes and diverse perspectives to explore alternative solutions

MANAGEMENT

These activities require that students work in groups of two or four to allow them to make observations. It is important to provide enough preparation time and supply each learning group the needed materials for these activities. Students are encouraged to work in pairs when using computers to do the Atmospheric, Geology and design a Planet activity.

CONTENT RESEARCH

All planets have weather. Some planets may not have a dynamic atmosphere of gases being driven by solar action, like Earth and Jupiter, but all will be under the influence of some kind of force, maybe direct solar or stellar heating, or even the extreme cold or energized matter comprising space weather.

VOCABULARY

Coriolis Effect. As it relates to weather, the rotational speed of a planet with a gaseous atmosphere will result in deflection of wind patterns depended upon the direction of the planet's rotation.

Life - Living organisms undergo metabolism, maintain homeostasis, possess a capacity to grow, respond to stimuli, reproduce and, through natural selection, adapt to their environment in successive generations.

Habitable – Capable of sustaining life.

Hospitable – Offering an environment for life.

LESSON ACTIVITIES

The Coriolis Effect. Demonstrate the true and apparent motions of objects as they move across the real Earth.

<http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Planetary.Geology.html>

Atmospheric, Geology and Design a Planet. Explore what makes a world habitable. This interactive website allows students to determine what makes a planet habitable and hospitable for life.

<http://astroventure.arc.nasa.gov/>

RELATED RESOURCES

Solar System Lithograph Set

This picture set features images of all the planets, especially those with dynamic atmospheres such as Earth, Jupiter, and Saturn.

http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Our_Solar_System_Lithograph_Set.html

The Atmosphere: Volcanoes on planets, especially on Earth can contribute to climate change. Learn how at:

<http://scifiles.larc.nasa.gov/text/kids/ProblemBoard/problems/light/sim3.html>

NASA CORE

The Central Operation of Resources for Educators, established in cooperation with Lorain County Joint Vocational School, serves as the worldwide distribution center for NASA-

MATERIALS

Coriolis Effect

- For each group of students a turntable that can be spun both ways, paper tape, colored markers (3). A “Lazy Susan” can be substituted for a turntable.

Atmospheric, Geology and design a Planet.

- Computers with Internet access.

produced multimedia materials.

For a minimal charge, CORE will provide a valuable service to educators unable to visit one of the NASA Educator Resource Centers by making NASA educational materials available through its mail order service <http://www.nasa.gov/offices/education/programs/national/core/about/index.html>

Studying Other Planet's Atmospheres: There are scientists that devote their careers studying the atmospheres of planets. Meet one person that does just that at NASA Jet Propulsion Laboratory in Pasadena, California.

<http://science.jpl.nasa.gov/people/Orton/>

DISCUSSION QUESTIONS

Weather patterns are influenced by the direction of a planet's rotation—for example, either east to west, or a west to east direction. How would weather fronts move in different hemispheres, on an earth-like planet, if the planet rotated opposite ours? HINT: Earth rotates on its axis west to east. *On our hypothetical earth-like planet, rotating east to west, the weather patterns would be opposite ours in each hemisphere.*

Do stars, like our sun show characteristics of the Coriolis Effect? *Yes, our Sun appears to show that part of the sun rotates at different speeds which may be depended in part upon the principles of the Coriolis Effect*

ASSESSMENT ACTIVITIES

Students are to research gaseous atmospheres of planets in our solar system and compare them to Earth. They are then to determine if any planets have similar weather patterns like ours.

ENRICHMENT

Invite a local television weather reporter come and speak to students about weather and some influences besides the Coriolis Effect that can influence weather.