



## LESSON PLAN: *National Geographic Magazine Archive 1995-present*

**Title:** The Planets of Our Solar System

**Grade Level(s):** 6-8 (Middle School)

**Subject/Content:** Earth and Space Science / Planets of our solar system, order of the planets.

**Overview & Purpose:** In order for students to understand the sun-moon-earth system of the universe, they must first understand what makes up the Milky Way and the ordering of the planets.

**Focus Question:** What are the planets in the solar system and how is each planet unique?

### **Materials and Resources Needed:**

- Database: National Geographic Virtual Library, National Geographic Magazine Archive 1995-present.  
["The Solar System 12 / 2006:8 Planets: the New Cosmic Order. "National Geographic Dec. 2006: \[172\]. National Geographic Virtual Library. Web. 12 May 2013.](#)
- 9 stations - 1 for each of the planets, plus one with general information about the solar system.
- Student note sheet for taking notes at each station.

### **Procedures:**

#### **Steps/Activities by the teacher:**

- Set up 9 stations around the room, each with information from the article about one planet and one with general information about the solar system.
- Pass out student worksheets.
- Have students go from station to station spending 2-3 minutes at each station copying down the information to their note sheet. It will vary from class to class how many students are in each group and how long they take.
- Student presentations- Have students present information from one of the planets in small groups. Each group is assigned a planet and must tell the class all of the information about their planet as well as the interesting fact that they learned.

#### **Steps/Activities by Student(s):**

- Go from station to station and collect information about each of the planets on your note sheet. There will only be 2-3 minutes at each station.
- Make sure to include all of the information on each planet as well as an interesting fact or two regarding each planet.
- Present the information on one of the planets to the class.

**Learning Objectives:** Students will have an understanding of how many planets there are in the solar system as well as a little background information regarding each planet.

**Skills Used:** Students will use their presentation skills in order to present information to the class in a logical and ordered manner.

**Homework/Assessment:** Homework- Write a paragraph on any planet but the one you presented. The paragraph should contain all of the necessary information on the planet as well as any interesting facts you found.

**Differentiation:**

- **Advanced-** For homework, have these students go a step further and compare and contrast two planets.
- **Struggling-** Partner struggling students with higher performing students; the higher performing students can help the struggling student with the work.

**Standards Alignment**

**Next Generation Science Standards:**

MS-ESS1-1: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system.

**National Curriculum Standards for Science:**

D. Earth and Space Science (Grades: 6-8)

3. Earth in the solar system

- a. The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets
- b. Most objects in the solar system are in regular and predictable
- c. Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar
- d. The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle

**Standard Source:** NSES 1996 from National Academies Press

**ISTE NETS for Students:**

Middle School

- Students apply digital tools to gather, evaluate, and use information.
- Students process data and report results.

**Standard Source:** ISTE NETS for Students, 2007

Name: \_\_\_\_\_  
Date: \_\_\_\_\_  
Period: \_\_\_\_\_

### Planets in the Solar System

**Instructions:** For each of the 8 planets and the 9<sup>th</sup> station with general information, answer the questions that follow.

#### Station 1: General Information

How many planets are there? \_\_\_\_\_

What is the definition of a planet? \_\_\_\_\_

\_\_\_\_\_

Based on the definition above, what did scientists decide Pluto was and why? \_\_\_\_\_

\_\_\_\_\_

#### Station 2: Mercury

Average distance from the sun: \_\_\_\_\_

Rotation period: \_\_\_\_\_

Orbital period: \_\_\_\_\_

Diameter: \_\_\_\_\_

Gravity: \_\_\_\_\_

Fun facts: \_\_\_\_\_

\_\_\_\_\_

#### Station 3: Venus

Average distance from the sun: \_\_\_\_\_

Rotation period: \_\_\_\_\_

Orbital period: \_\_\_\_\_

Diameter: \_\_\_\_\_

Gravity: \_\_\_\_\_

Fun facts: \_\_\_\_\_

\_\_\_\_\_

#### Station 4: Earth

Average distance from the sun: \_\_\_\_\_

Rotation period: \_\_\_\_\_

Orbital period: \_\_\_\_\_

Diameter: \_\_\_\_\_

Gravity: \_\_\_\_\_

Fun facts: \_\_\_\_\_

\_\_\_\_\_

#### Station 5: Mars

Average distance from the sun: \_\_\_\_\_

Rotation period: \_\_\_\_\_

Orbital period: \_\_\_\_\_  
Diameter: \_\_\_\_\_  
Gravity: \_\_\_\_\_  
Fun facts: \_\_\_\_\_  
\_\_\_\_\_

**Station 6: Jupiter**

Average distance from the sun: \_\_\_\_\_  
Rotation period: \_\_\_\_\_  
Orbital period: \_\_\_\_\_  
Diameter: \_\_\_\_\_  
Gravity: \_\_\_\_\_  
Fun facts: \_\_\_\_\_  
\_\_\_\_\_

**Station 7: Saturn**

Average distance from the sun: \_\_\_\_\_  
Rotation period: \_\_\_\_\_  
Orbital period: \_\_\_\_\_  
Diameter: \_\_\_\_\_  
Gravity: \_\_\_\_\_  
Fun facts: \_\_\_\_\_  
\_\_\_\_\_

**Station 8: Uranus**

Average distance from the sun: \_\_\_\_\_  
Rotation period: \_\_\_\_\_  
Orbital period: \_\_\_\_\_  
Diameter: \_\_\_\_\_  
Gravity: \_\_\_\_\_  
Fun facts: \_\_\_\_\_  
\_\_\_\_\_

**Station 9: Neptune**

Average distance from the sun: \_\_\_\_\_  
Rotation period: \_\_\_\_\_  
Orbital period: \_\_\_\_\_  
Diameter: \_\_\_\_\_  
Gravity: \_\_\_\_\_  
Fun facts: \_\_\_\_\_  
\_\_\_\_\_



# Station 1

The correct answer to “How many planets are there?” is once again “eight.” The solar system’s exclusive planetary club has officially returned to the membership it claimed before 1930. That’s the year Pluto came aboard as an endearing oddball—so small, so far out. Then in 1992, the discovery that Pluto’s immediate neighborhood, a region called the Kuiper belt, held other Pluto-like bodies set off a debate: What is a planet? How many should there be? Nine? Ten? An ever rising number as new findings occur? Last August the International Astronomical Union approved a concise but controversial definition: A planet must orbit the sun; it must not be a satellite; it must be massive enough for its own gravity to keep it round, and also big enough to dominate its orbit. On the last requirement, Pluto falls short—other orbiting bodies also occupy the Kuiper belt. Pluto instead will be loosely classified a “dwarf planet,” along with the asteroid Ceres and the recently discovered Kuiper belt body named Eris. Other candidates are pending. Dwarf planets with orbits beyond Neptune will be given a special category, as yet untitled, and Pluto will be honored as the prototype.

## Station 2

**MERCURY**  (Diagram shows angle of planet's rotational axis.)

**Average distance from sun** 35.9 million miles

**Rotation period (day)** 58.6 Earth days

**Orbital period (year)** 87.9 Earth days

**Diameter** 3,032 miles

**Gravity** 100 Earth pounds = 38 pounds on Mercury

Only slightly larger than Earth's moon, which its cratered surface resembles, the smallest planet is virtually without an atmosphere and has the most extreme daily temperature swings of any planet, from about 800°F to minus 280°F. Its axis is almost vertical, so polar regions get little to no sun and may hold ice.

# Station 3

## VENUS ♀

**Average distance from sun** 67.2 million miles

**Rotation period (day)** 243 Earth days

**Orbital period (year)** 224.7 Earth days

**Diameter** 7,521 miles

**Gravity** 100 Earth pounds = 91 pounds on Venus

Though nearly twice as far from the sun as Mercury, Venus is almost 100 degrees hotter. Beneath a cauldron of sulfuric acid clouds, a carbon dioxide atmosphere holds solar energy with scorching efficiency—a greenhouse effect run wild. Massive volcanoes, some perhaps active, tower on its surface.



# Station 4

## EARTH

**Average distance from sun** 93 million miles

**Rotation period (day)** 23.9 hours

**Orbital period (year)** 365.2 days

**Diameter** 7,926 miles

**Number of moons** 1

Earth is the one spot in the solar system known to support life, and the only place confirmed to be rich in liquid water.

# Station 5

## MARS

**Average distance from sun** 141.6 million miles

**Rotation period (day)** 24.6 hours

**Orbital period (year)** 686.9 Earth days

**Diameter** 4,222 miles

**Gravity** 100 Earth pounds = 38 pounds on Mars

**Number of moons** 2

Titanic forces have made Mars a planet of superlatives:

The solar system's tallest mountain, a volcano two and a half times the height of Everest; a canyon that would stretch from California to New York; and evidence of cataclysmic floods before liquid water vanished more than three billion years ago.

# Station 6

## JUPITER ☃

**Average distance from sun** 483.7 million miles

**Rotation period (day)** 9.9 hours

**Orbital period (year)** 11.9 Earth years

**Diameter** 88,846 miles

**Gravity** 100 Earth pounds = 250 pounds on Jupiter

**Number of moons** 63 (48 named)

A stormy ball of mostly hydrogen and helium, the largest planet looks layered because alternating east and west winds separate zones of varied composition and temperature. Winds in the Great Red Spot hit 400 miles an hour. Jupiter's entourage of moons includes Europa, with a possible watery ocean beneath a mantle of ice, and Io, with active volcanoes. Like the other giant planets, Jupiter formed under conditions that let it collect rings.

# Station 7

## SATURN ♄

**Average distance from sun** 885.9 million miles

**Rotation period (day)** 10.7 hours

**Orbital period (year)** 29.5 Earth years

**Diameter** 74,898 miles

**Gravity** 100 Earth pounds = 106 pounds on Saturn

**Number of moons** 56 (35 named)

Saturn's winds may approach a thousand miles an hour at the equator, neck and neck with Neptune's as the fastest in the solar system. Its majestic main rings—reaching 165,000 miles in diameter but averaging only 150 feet thick—may be shattered icy remnants of comets or moons harnessed by the planet's gravity.

# Station 8

## URANUS

**Average distance from sun** 1.8 billion miles

**Rotation period (day)** 17.2 hours

**Orbital period (year)** 84 Earth years

**Diameter** 31,764 miles

**Gravity** 100 Earth pounds = 86 pounds on Uranus

**Number of moons** 27

The cast of planets known to ancient astronomers first grew in 1781 when Uranus was discovered by telescope. Methane colors its atmosphere blue. The planet spins on a 98-degree axis, probably knocked sideways by the impact of an Earth-size object. While other planets spin around the sun like tops, Uranus rolls like a ball.

# Station 9

## NEPTUNE ♃

**Average distance from sun** 2.8 billion miles

**Rotation period (day)** 16.1 hours

**Orbital period (year)** 164.8 Earth years

**Diameter** 30,776 miles

**Gravity** 100 Earth pounds = 110 pounds on Neptune

**Number of moons** 13 (9 named)

Like all the giant planets except Uranus, Neptune (discovered in 1846) generates more heat than it absorbs from the distant sun. That internal heat creates weather: winds topping 900 miles an hour and storms akin to Jupiter's Great Red Spot.