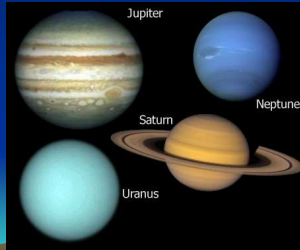


Outer Planets Notes

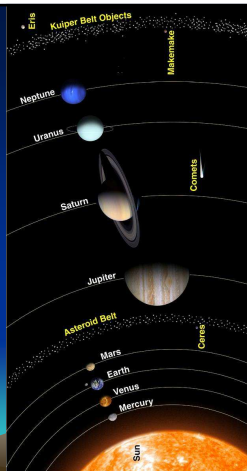


The Outer Planets

- **Gas Planets**
 - “gas giants” or “Jovian planets”
 - Made mostly of gas & liquid hydrogen & helium, similar to the Sun!
 - Very large planets with strong gravity
 - All have many moons and planetary rings
 - Jupiter, Saturn, Uranus, Neptune

Order of the Solar System

- Sun
- Inner Planets
- Asteroid Belt
- Outer Planets
 - Jupiter
 - Saturn
 - Uranus
 - Neptune
- Kuiper Belt
 - Asteroids
 - Pluto
 - Haumea
 - Makemake
 - Eris
- Oort Cloud
 - Comets




Planetary Rings

- Made of small particles of rock, ice, and dust, orbiting a planet in a flat disc shape.



6th Planet - Jupiter



Inside Gas Giant JUPITER

The largest planet in our solar system, Jupiter could hold more than 1,200 Earths. It has dozens of moons and an enormous magnetic field. The planet, mostly a giant ball of gas and liquid, also has a dark ring system composed of fine dust grains.

TURBULENT ATMOSPHERE
89.8% hydrogen, 10.2% helium, plus trace gases.

GRAVITY
2.4 OF EARTH
EARTH: 200 lbs. JUPITER: 400 lbs.

SURFACE CONDITIONS
AIR PRESSURE: 1,000x Earth
TEMPERATURE: Varies by depth
WINDS: Over 400 mph in the upper atmosphere.

METAL CORE Jupiter's core is probably made up of layers of metals and rocks, along with methane ice, ammonia ice and water ice.


Jupiter is over 11x larger than the Earth.

This image of Jupiter's clouds was taken in 1979 by the Voyager 2 spacecraft.

ROSS TORO, SPACE.com

- King of Planets!!!
- Has at least 67 moons and planetary rings
- Four largest moons are the Galilean moons: Io, Europa, Ganymede, Callisto

7th Planet - Saturn



Inside Gas Giant SATURN

Saturn is the most distant planet which can be seen with the unaided eye. When Galileo became the first person to look at Saturn through a telescope in 1610, he saw strange ear-like shapes at the sides of the planet; his telescope was not sharp enough to reveal that the shapes were actually rings.

THICK ATMOSPHERE
96.5% carbon dioxide, 3.5% nitrogen plus trace gases.

GRAVITY 1.1 OF EARTH
EARTH: 100 lbs. SATURN: 9.4 R. dunk

MAGNIFICENT RING SYSTEM
composed almost entirely of water-ice chunks that are under 30 ft (10 m) in diameter.

TINY CORE OF ROCK AND METAL
The solid core of Saturn may be the size of Earth. It is surrounded by thick layers of metallic hydrogen.


Saturn's moon Titan and tiny Epimetheus orbit beyond the ring system in this camera photo.

Saturn is oblate, meaning that it is wider at the equator than at the poles. Saturn's equatorial diameter of 74,898 mi (120,536 km) is about 9.4 times that of Earth.

KARL TATE, SPACE.com

- Famous ring system
- 62 moons
- Low density, could float on water
- Frozen, slushy atmosphere
- Largest moon is Titan (2nd largest in SS), has it's own atmosphere

8th Planet - Uranus



Inside Gas Giant URANUS

The seventh planet in our solar system is a giant ball of gas and liquid. It is tilted so far on its side that its axis lies nearly level with its path around the sun. Like the other gas and ice giants, Uranus has thick cloud cover. Its blue-green color is the result of methane in its atmosphere.

SMOGGY ATMOSPHERE
83% hydrogen, 15% helium, 2% methane plus trace gases.

GRAVITY 0.9 OF EARTH
EARTH: 100 lbs. URANUS: 13.1 R. dunk

SURFACE CONDITIONS
AIR PRESSURE: 1.5x Earth
TEMPERATURE: 4,200°F (2,300°C)
WINDS: About 450 mph.

ROCKY CORE The center of Uranus may be a rocky core about the size of Earth. More than 80% of the planet's mass is a fluid mix of water, methane and ammonia ices.


Image of Uranus' rings was taken in 2007 by the Hubble Space Telescope.

Uranus, with a diameter of 31,763 miles (51,118 km), is over 4x that of Earth.

ROSS TORO, SPACE.com

- Sometimes called an "ice giant" rather than "gas giant", atmosphere contains lots of "ices"
- The "sideways planet", axis is tilted 98°, rotates top to bottom
- 27 moons

9th Planet - Neptune



Inside Gas Giant NEPTUNE

Neptune's existence was inferred mathematically before it was first observed in 1846. The planet takes more than 165 Earth years to complete one orbit of the sun. When the Voyager 2 probe visited Neptune in 1989 it found a "Great Dark Spot" in the atmosphere, but more recent photos show the spot has since vanished.

THICK ATMOSPHERE
80% hydrogen, 19% helium plus ice of ammonia and water.

GRAVITY 1.14 OF EARTH
EARTH: 100 lbs. NEPTUNE: 10.4 R. dunk

NEPTUNE HAS THE FASTEST WINDS IN THE SOLAR SYSTEM, UP TO 1,300 mph (2,100 km/h)

CORE OF ROCK AND ICE

MANTLE OF WATER, AMMONIA, METHANE ICES

Neptune's moon Triton is the only major moon in the solar system that orbits "backwards"

Neptune, 39,768 mi (64,550 km) in diameter, is nearly 4 times the size of Earth.

KARL TATE, SPACE.com

- Also an "ice giant"
- Existence was determined mathematically before being seen thru a telescope!
- Fastest winds in solar system

