

Do Now:

- Label next 2 pages in ISN “Gas Giants”
- Make sure the following assignments are turned in:
 - *A3K Article Analysis*
 - *Small Group Test Corrections Form (if applicable)*

Astronomical Bodies in The Solar System

The Gas Giant Planets

Unpacking the Benchmark

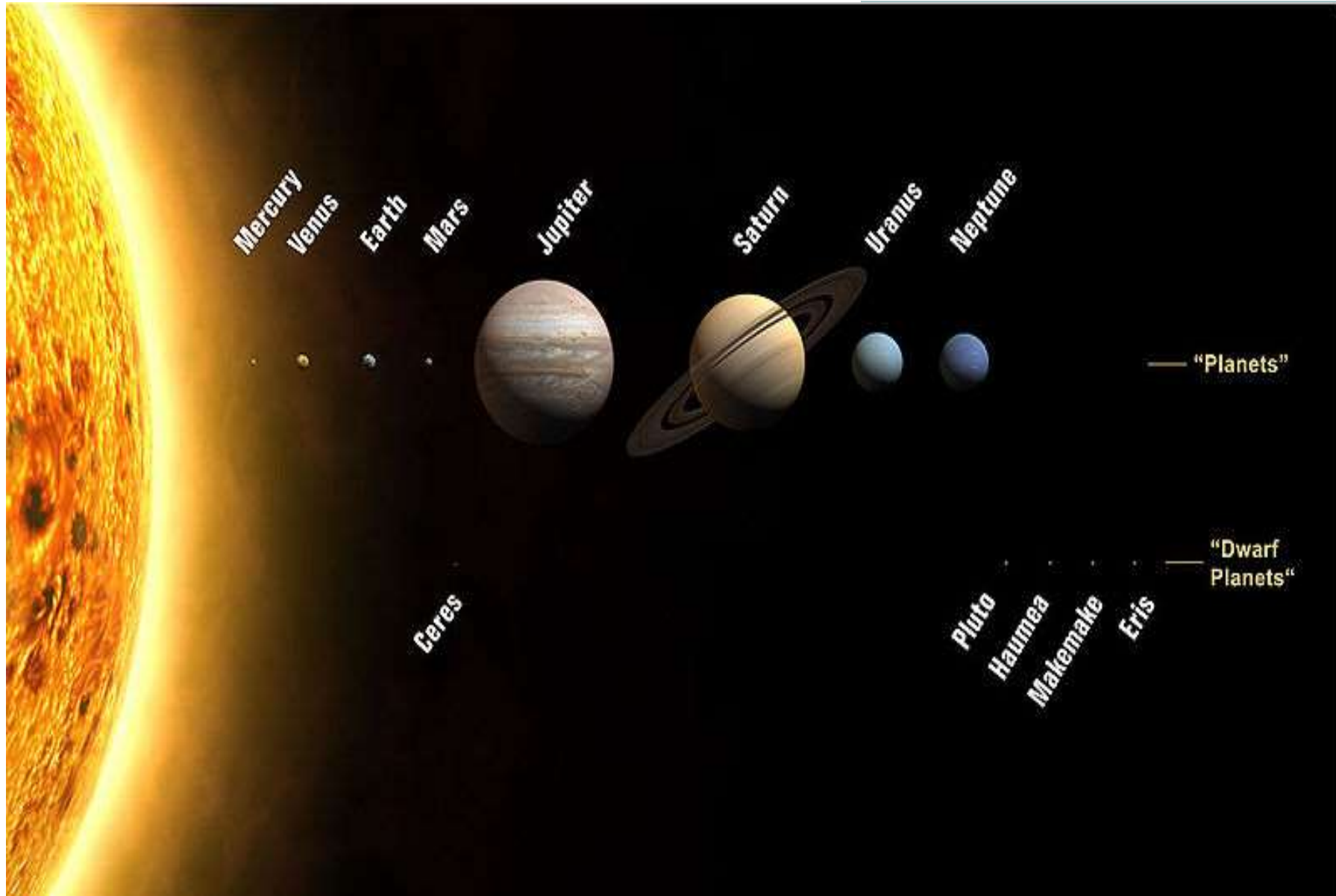
- SC.8.E.5.3 Distinguish the hierarchical relationships between planets and other astronomical bodies relative to the solar system, galaxy, and universe, including distance, size, and composition. High (EOC)
REWRITE
- **KNOW:** The order of the universe. Size, distance and composition.
- **DO:** Compare the relationships between bodies in space.

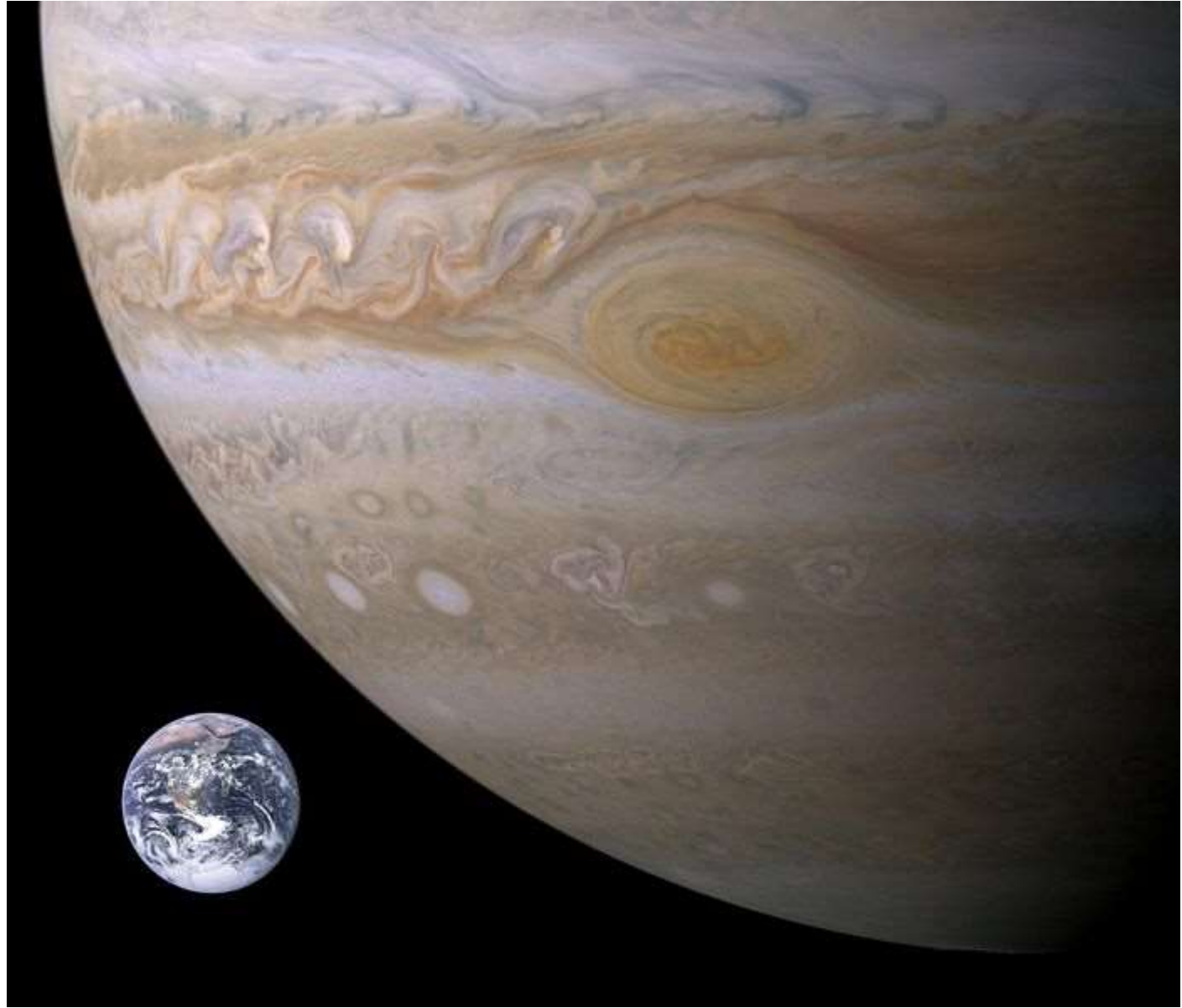
Unpacking the Benchmark

- SC.8.E.5.7 Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions. Moderate. (EOC)
- **REWRITE**
- **KNOW:** The bodies in the Solar System & their gravity, speed, distance, movement, temp and atmo condition.
- **DO:** Compare/Contrast with the EARTH

Measuring distances in the solar system

- It is not useful to use km or mi for large distances
- The astronomical unit (AU) is used to measure within solar system
- 1 AU = average distance from Earth to the Sun
 - 93 million miles





Inside 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
480 lbs.

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



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

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.

Jupiter

Part 1 of 3

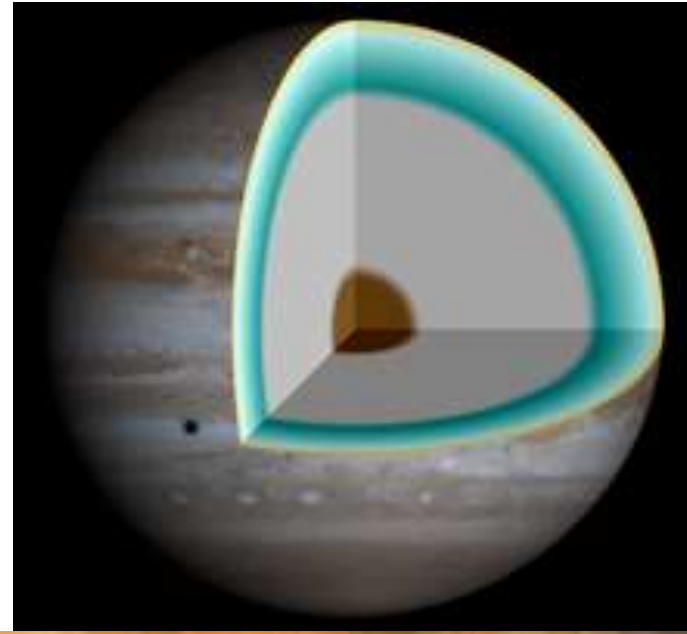
- Distance from Sun: 5.2 AU
- Mass: 317.8 Earths
- Surface Temperature: -162°F
- Revolution: 11.86 Earth years
- Rotation: 10 hours
- Moons: 67 Moons, 4 Galileian



Planet Structure

Part 2 of 3

- Solid Core with a liquid Hydrogen Outer Layer
- Atmosphere of Hydrogen and Helium gas.
- Red Spot is a storm **LARGER THAN EARTH!**



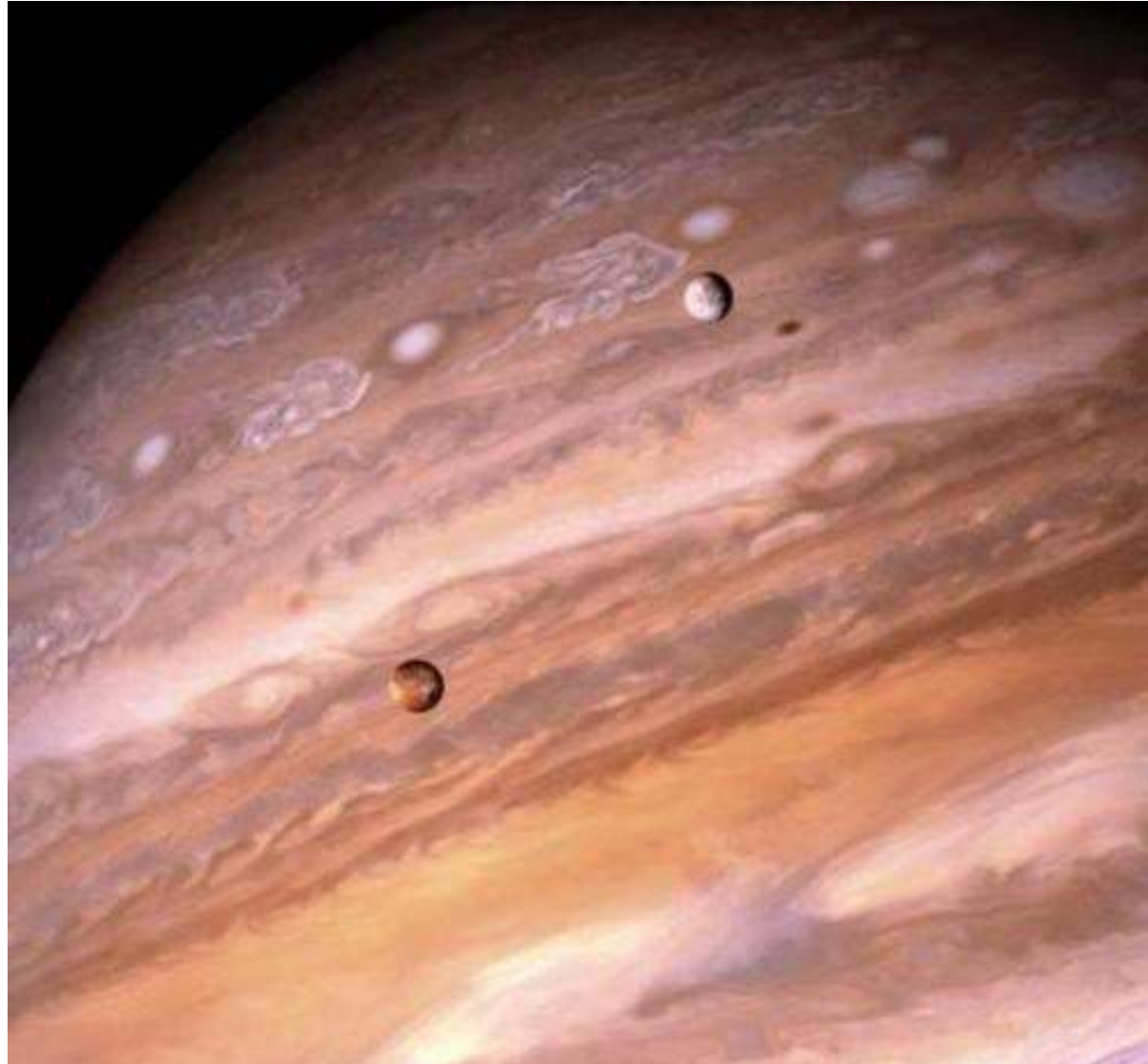
Moons

Part 3 of 3

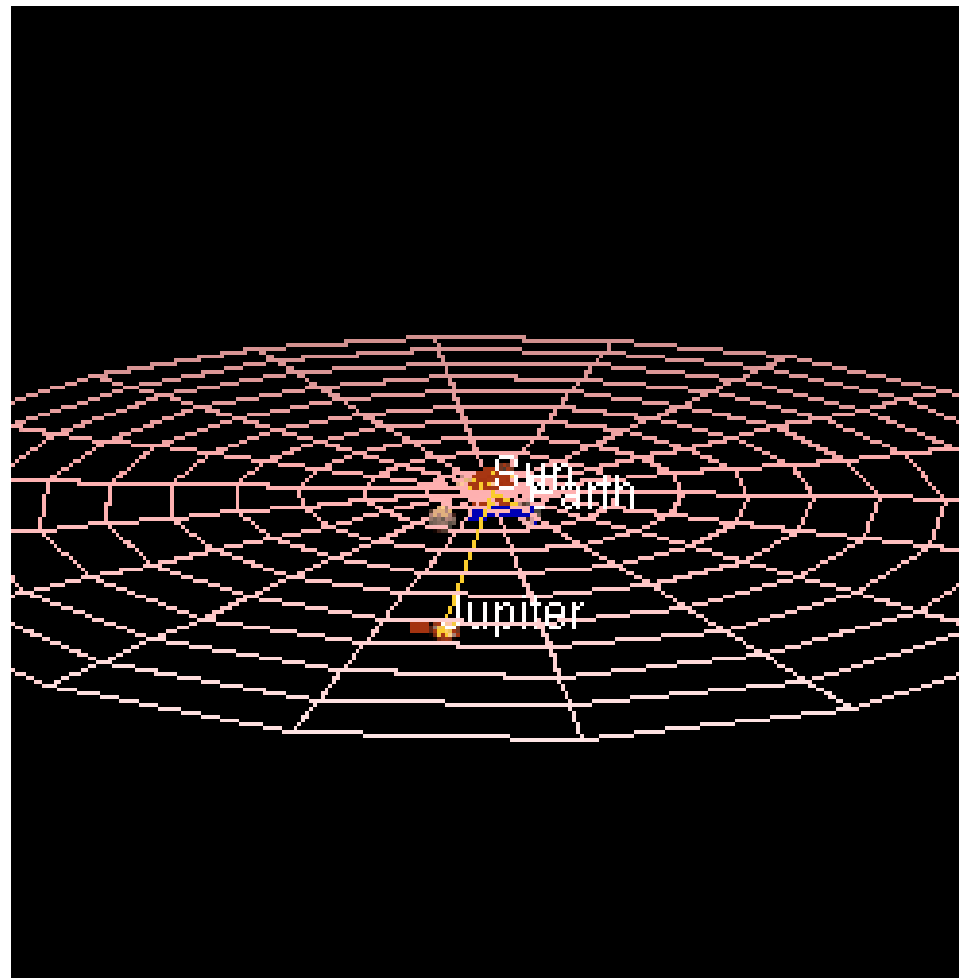
- 67 moons
- The four largest were discovered by Galileo in the early 1600s.
- Galilean Moons:
 - Io, Europa, Ganymede, Callisto



Jupiter and it Moons



Revolution Compared to Earth



Jupiter's Red Spot ONE GIANT STORM!

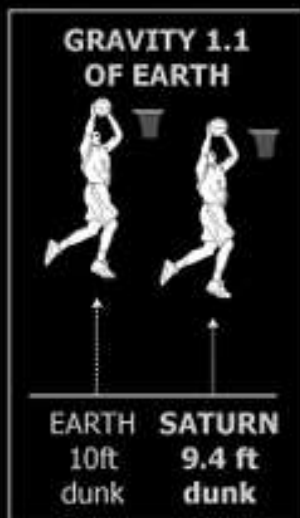


Inside Gas Giant SATURN

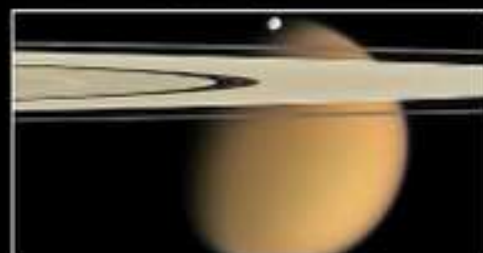
Saturn is the most distant planet which can be seen with the unaided eye.

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
Mostly hydrogen (96.3%) and helium (3.25%), with trace amounts of methane and ammonia



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



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

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 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.

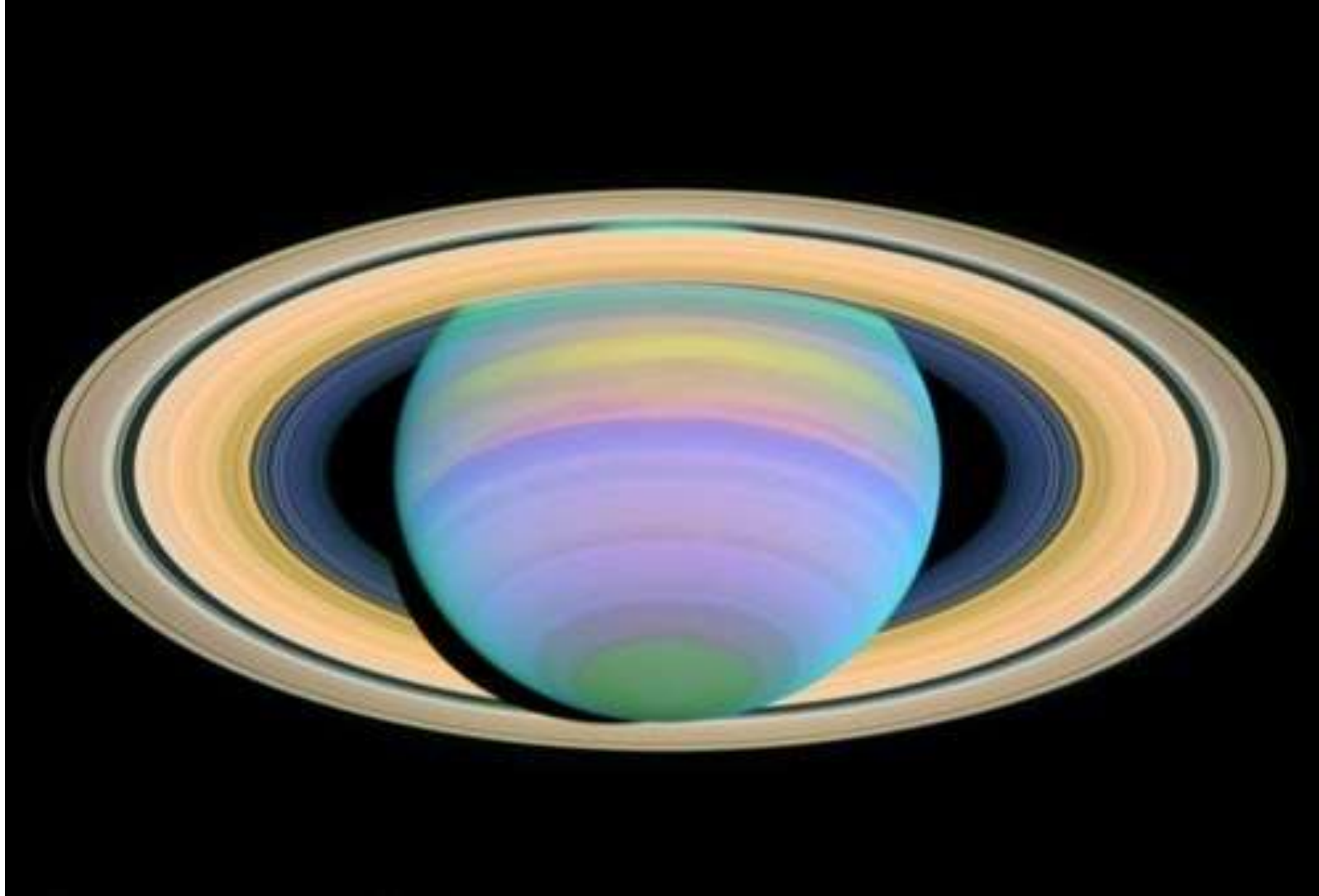
Saturn

Part 1 of 3



- Distance from Sun: 9 AU
- Mass: 95 Earths
- Temperature: -218 °F
- Revolution: 29.4 Earth years
- Rotation: 10.5 hours
- Moons: 62 Moons

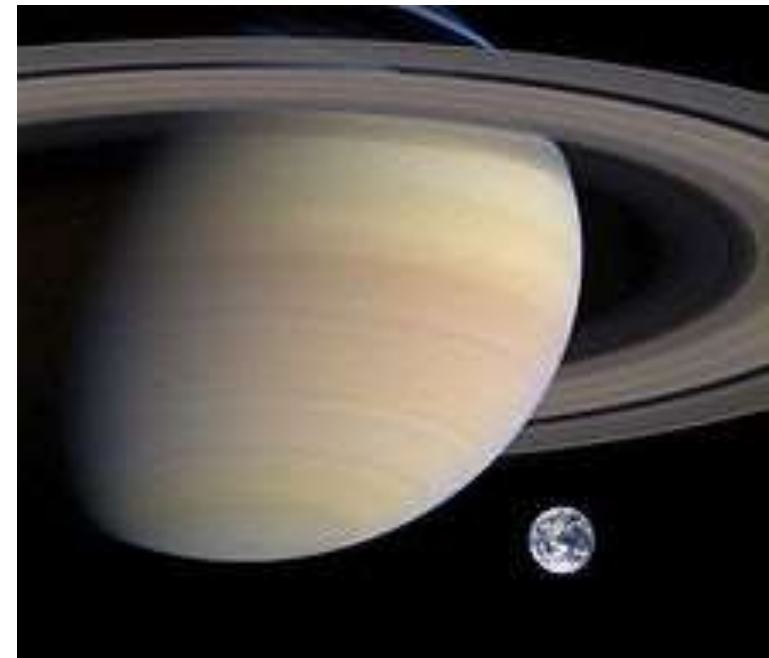
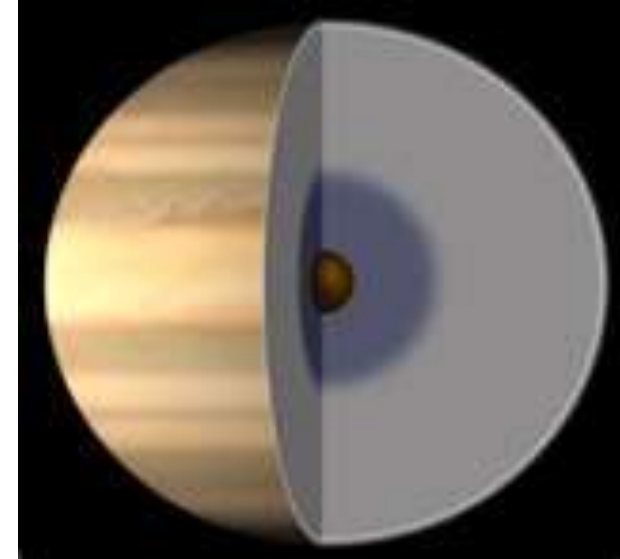
Saturn in Ultraviolet



Planet Structure

Part 2 of 3

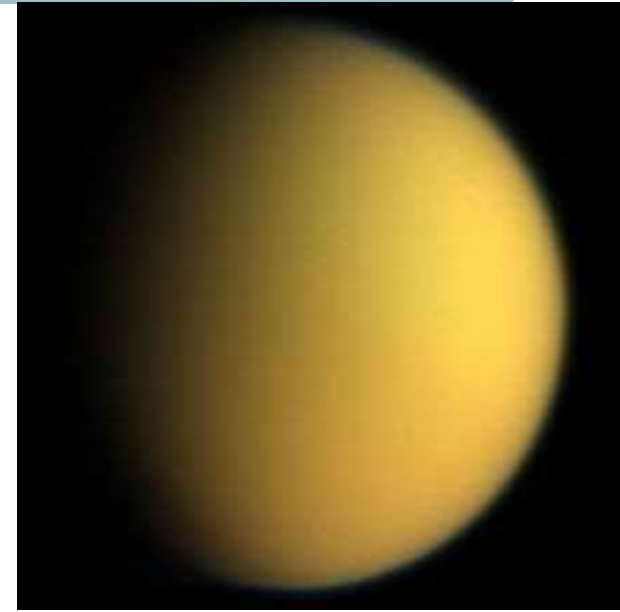
- Solid Rocky Core
- Layer of Liquid Metallic Hydrogen
- Atmosphere of liquid Hydrogen and Helium.



Moons & Rings

Part 3 of 3

- 62 moons
- Titan is the Largest
- Rings are made from ice (water)
- Remnants of a destroyed moon?
- Gaps in the rings are due to the gravity of its moons



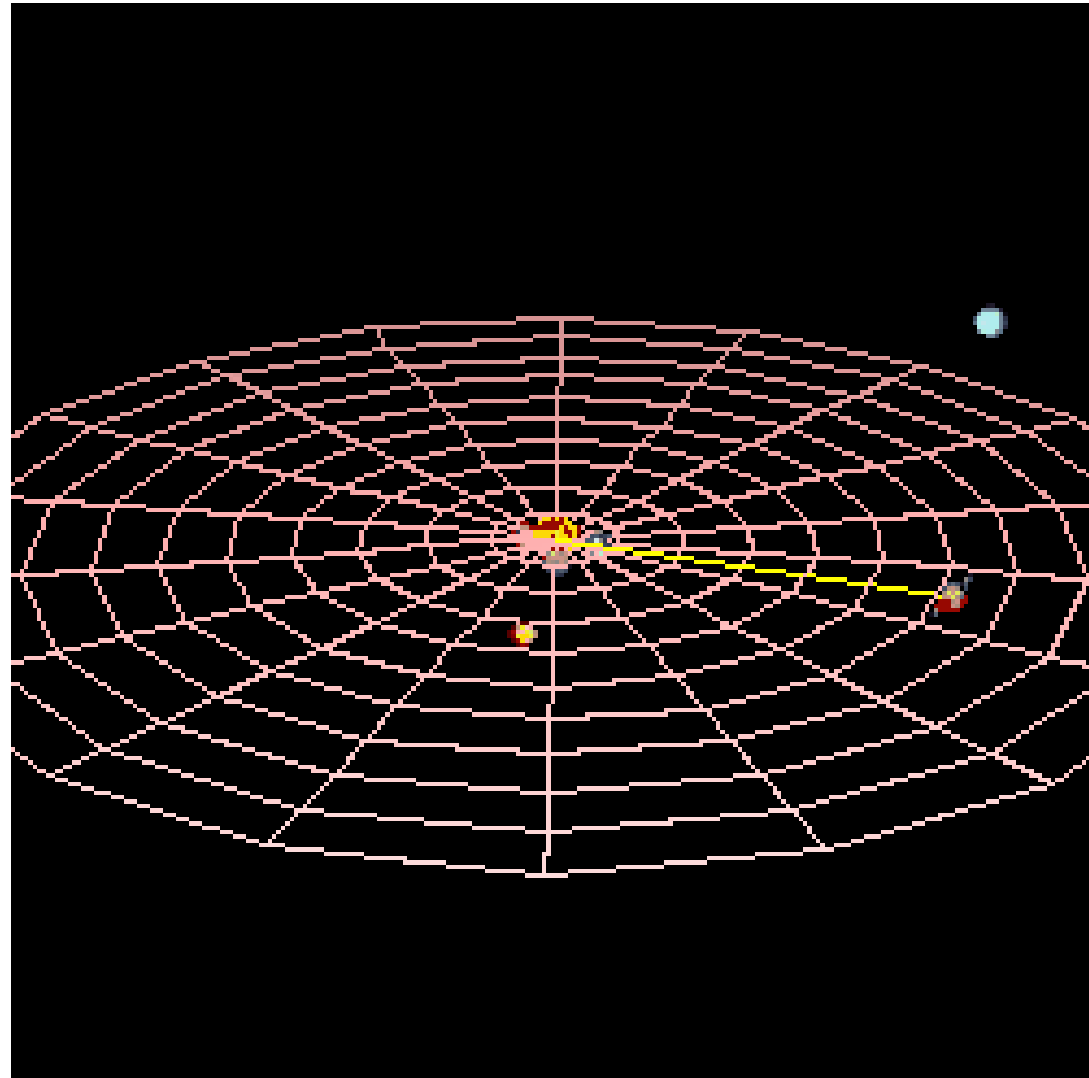
SATURN



**Undefeated Solar System
Hula Hoop Champ**

AWKWARDYETI

Revolution Compared to Earth

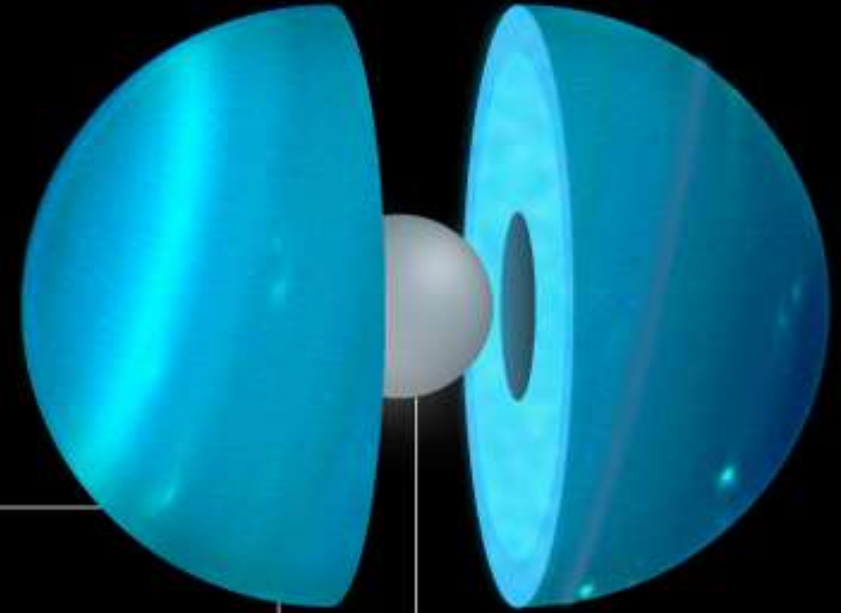


Inside Uranus “The Gas (& Ice) Giant”

Inside Gas Giant URANUS

SPACE
.COM

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



SURFACE CONDITIONS
AIR PRESSURE: 1.3x Earth
TEMPERATURE: 4,200°F (2,300°C)
WINDS: About 450 mph.

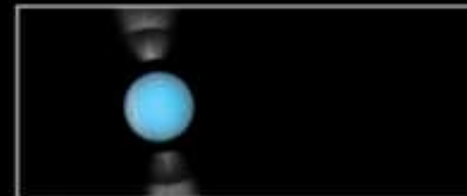


Image of Uranus' rings was taken in 2007 by the Hubble Space Telescope.

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.



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

And then... and then the teacher said...



“Uranus is one of the gas giants!”

Uranus

Part 1 of 3



- ICE GIANT!
- Distance from Sun: 20 AU
- Mass: 14.5 Earths
- Temperature: -323 °F
- Revolution: 84 Earth years
- Rotation: 17 hours CLOCKWISE (RETROGRADE)
- Moons: 27 Moons

Planet Structure

Part 2 of 3

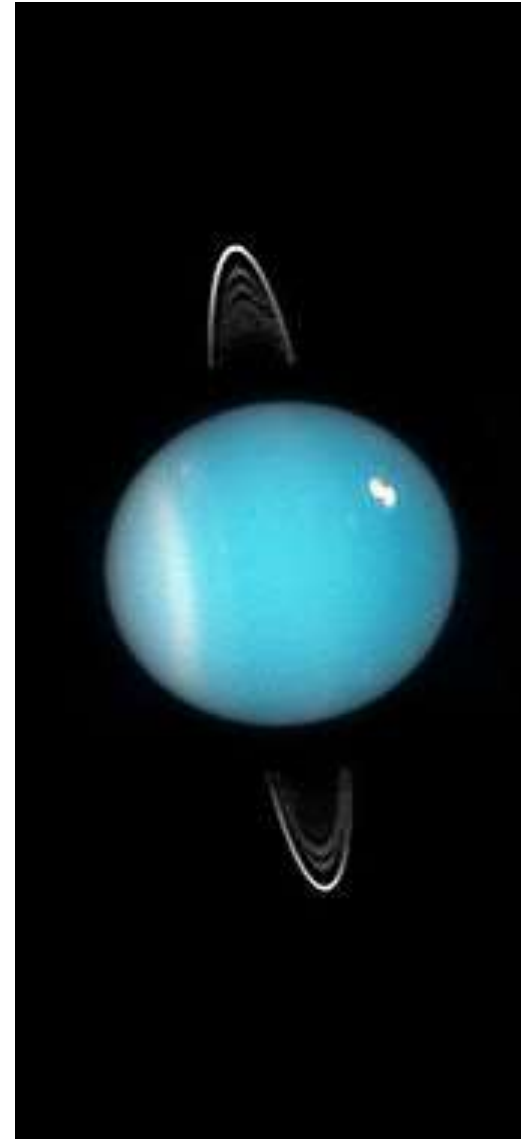
- Solid Iron Core
- Mantle- Ice from water, methane and ammonia
- Atmosphere of Hydrogen and Helium gas
- Considered an “Ice Giant”.
SPINS ON ITS SIDE!



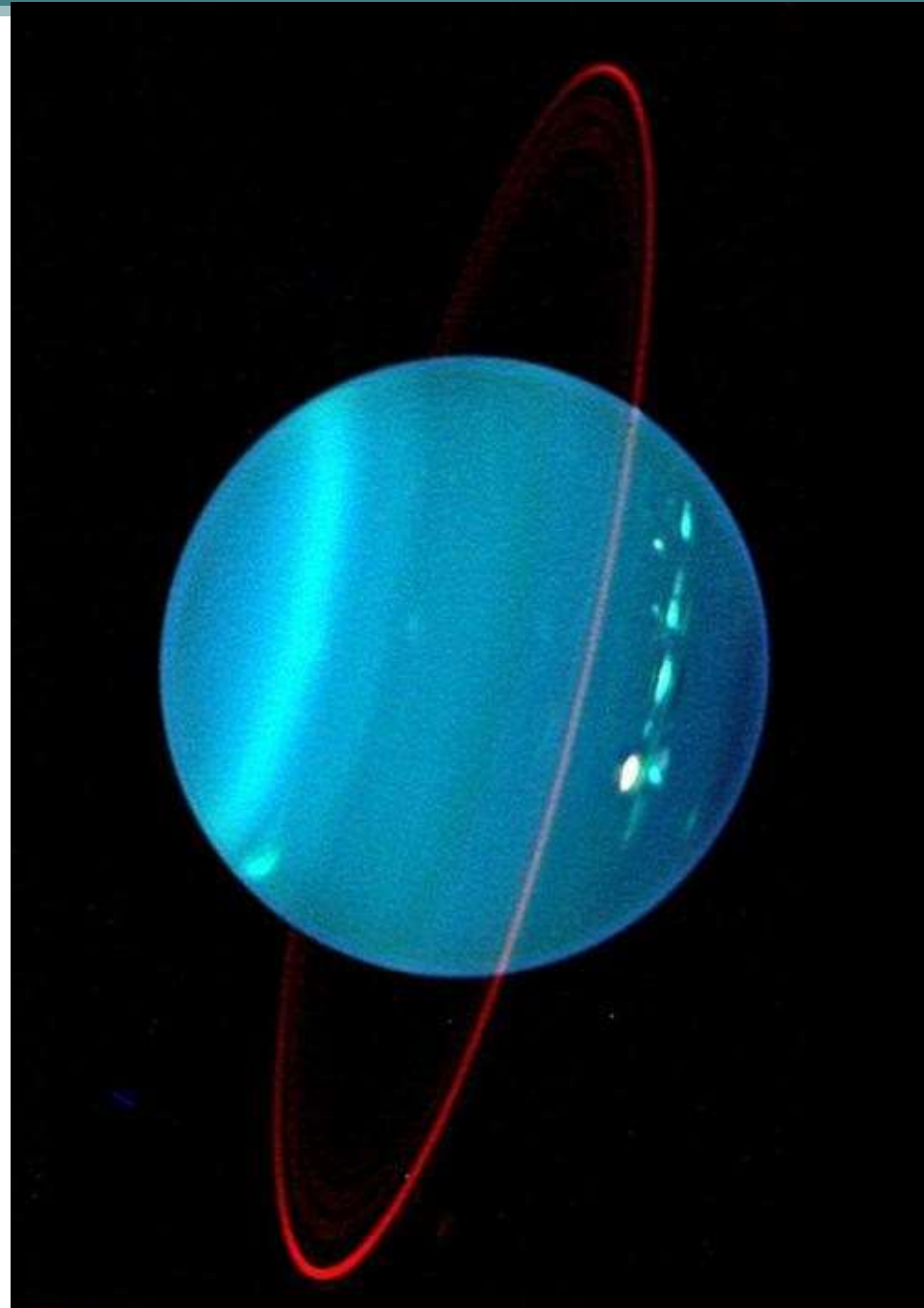
Moons & Rings

Part 3 of 3

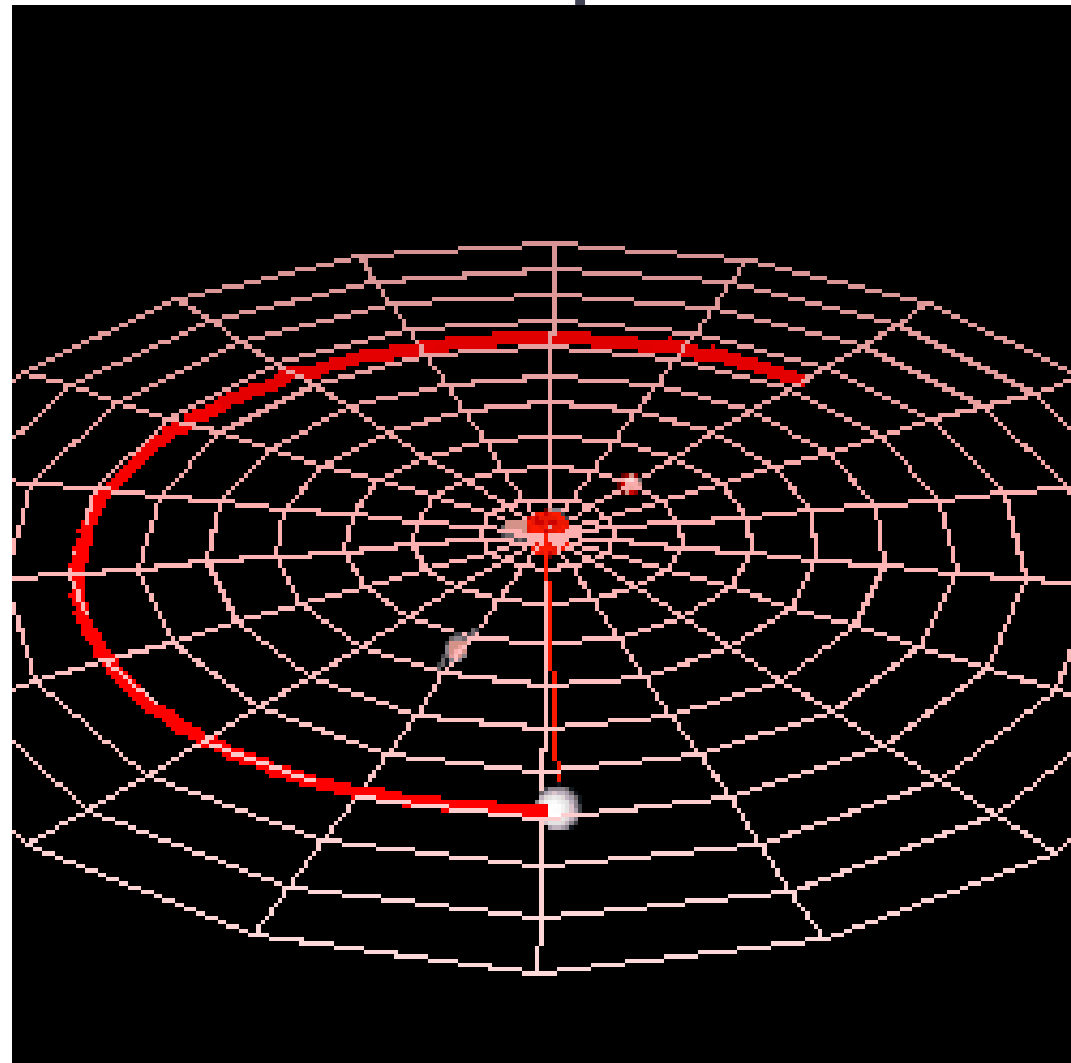
- 27 moons
- Ex) Titania, Oberon
- Rings are made from ice (water)
- Planet spins on its side due to a early planetary collision.



Uranus (and its Ring) in Infrared



Revolution Compared to Earth



Inside Neptune “The Ice Giant”

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 ices of ammonia and water

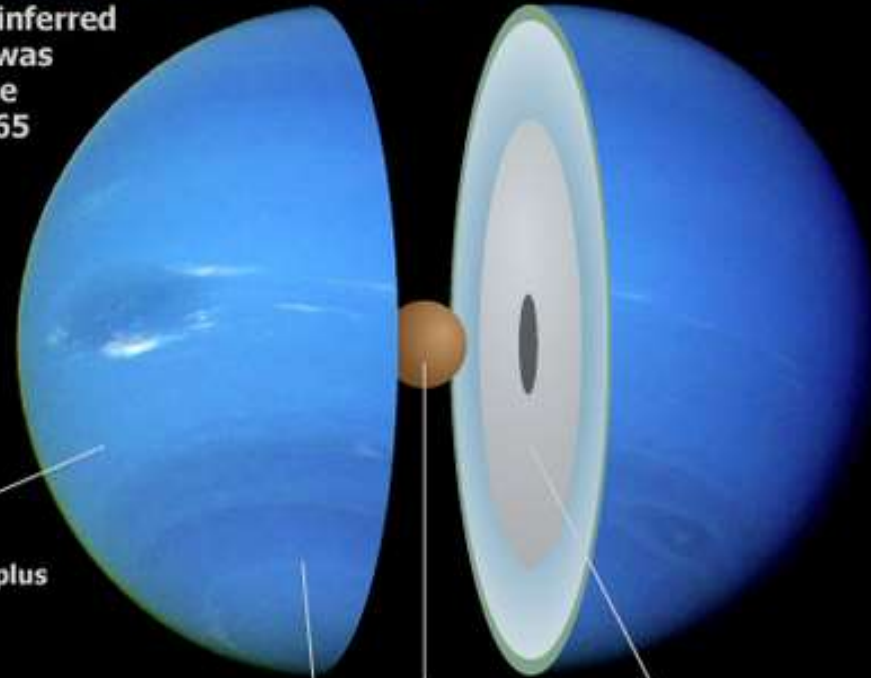
GRAVITY 1.14 OF EARTH

| Planet | Jump Height |
|---------|-------------|
| EARTH | 10 ft dunk |
| NEPTUNE | 8.5 ft dunk |

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



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



CORE OF ROCK AND ICE

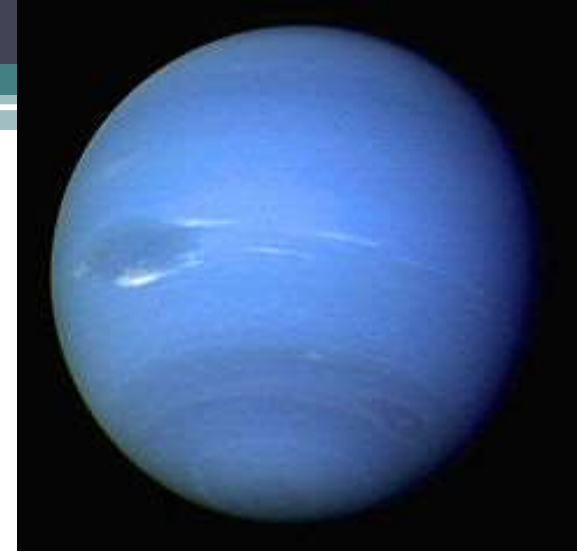
MANTLE OF WATER, AMMONIA, AND METHANE ICES



Neptune, 30,760 mi (49,500 km) in diameter, is nearly 4 times the size of Earth

Neptune

Part 1 of 3

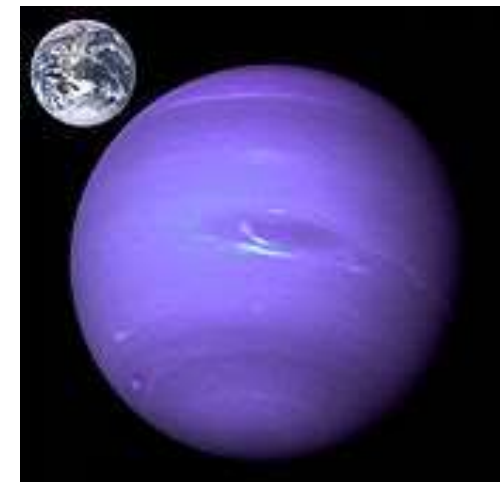
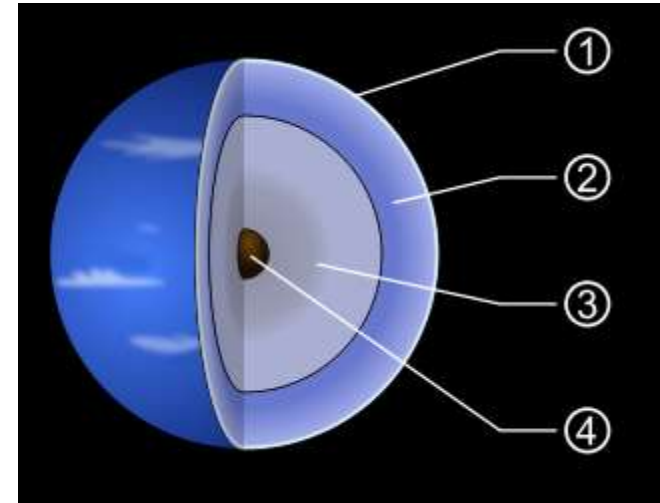


- THE ICE GIANT
- Distance from Sun: 30.1 AU
- Mass: 17 Earths
- Temperature: -330 °F
- Revolution: 165 Earth years
- Rotation: 18 hours
- Moons: 13 Moons

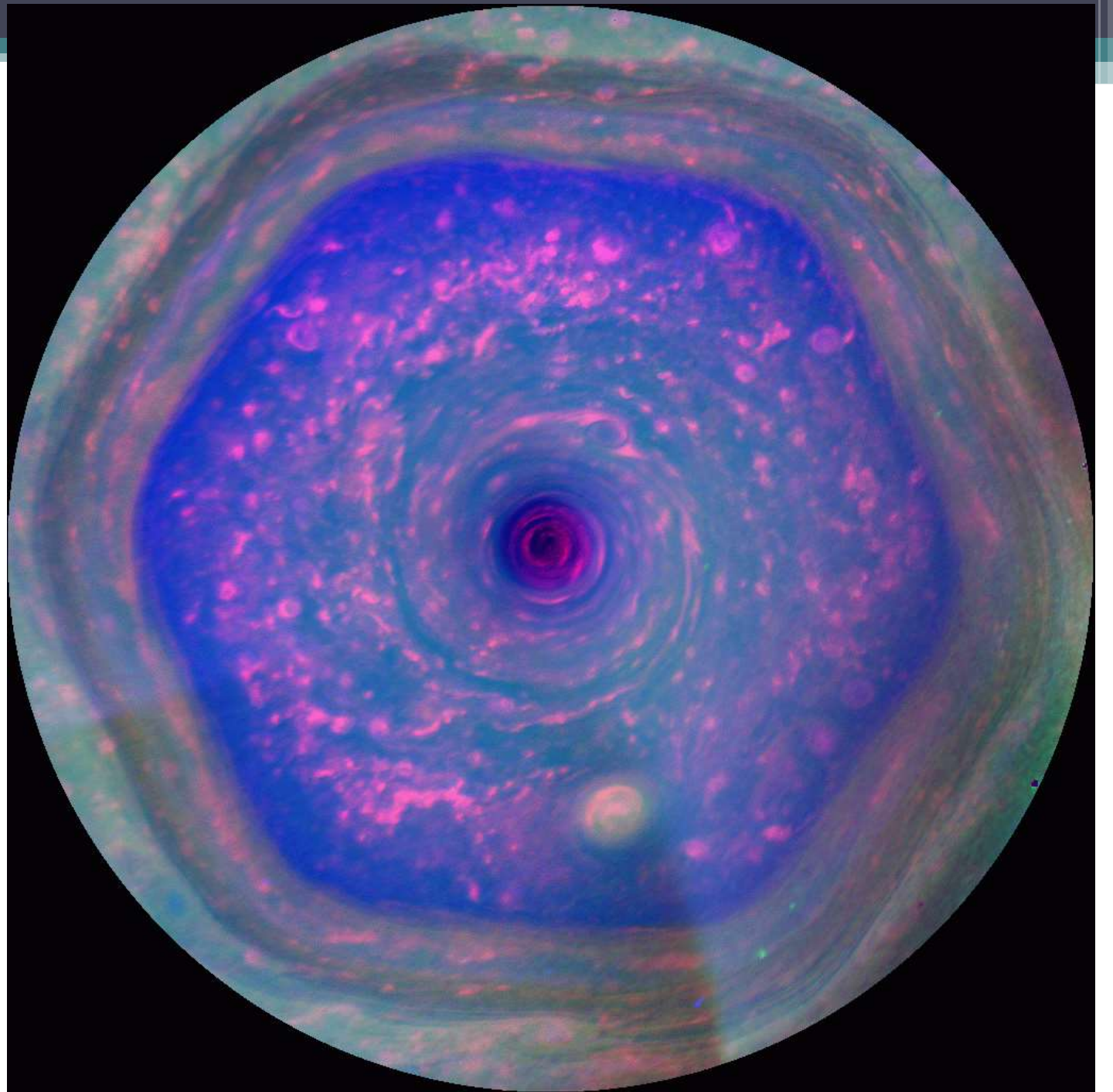
Planet Structure

Part 2 of 3

- Rocky Core
- Mantle of Ices- water, ammonia, methane
- Atmosphere of Hydrogen, Methane and Helium gas
- Considered an “Ice Giant”.



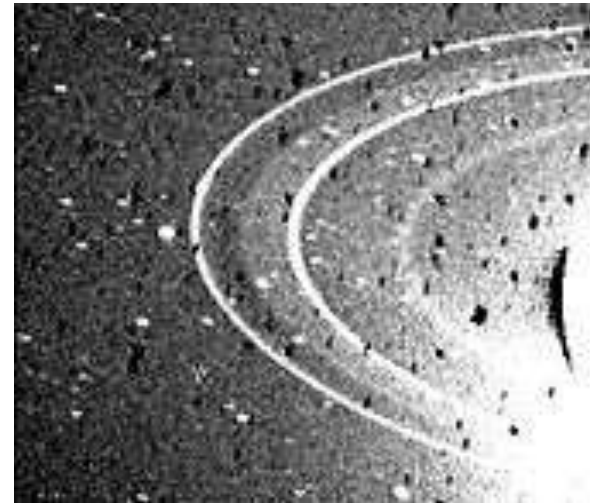
Neptune's
large
hexagonal
storm at its
pole.



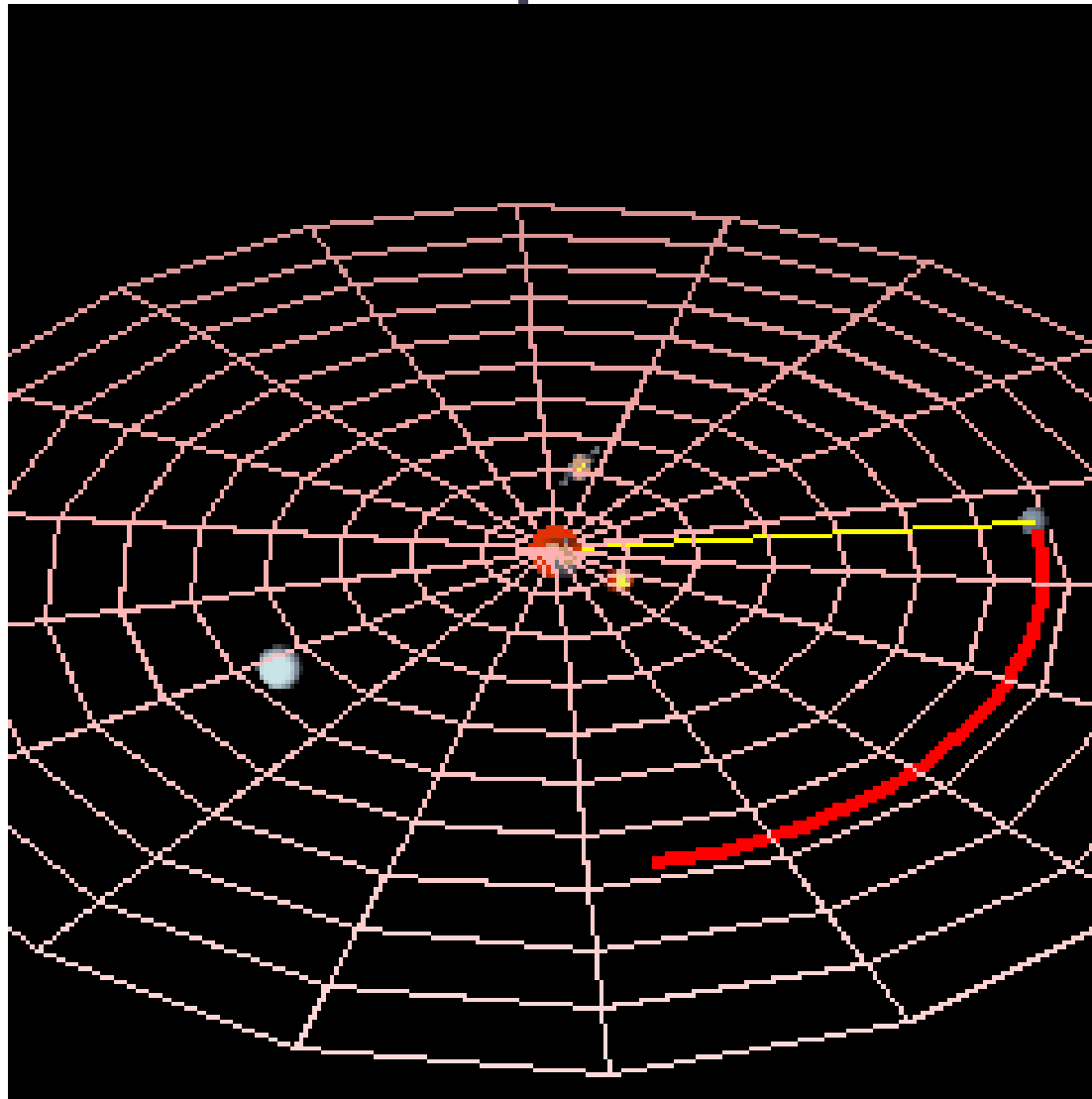
Moons & Rings

Part 3 of 3

- 13 moons
- Largest is Triton
- Triton-Retrograde orbit means that it was a captured moon.
- Has a smaller ring system



Revolution Compared to Earth



How big would the sun look on other planets?



Mercury

Venus

If you could see the sun through the clouds!

Earth

Mars

Jupiter

Saturn

Uranus

Neptune



How does a planet's distance from the sun affect the way you see an object?