



Virtual Learning

# Aerospace Engineering

**Uranus**

May 13, 2020



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## Lesson: May 13, 2020

### **Objective/Learning Target:**

Students will learn about Uranus by exploring various aspects of planet.



## **Bell Work:**

How far away is Uranus from Earth?

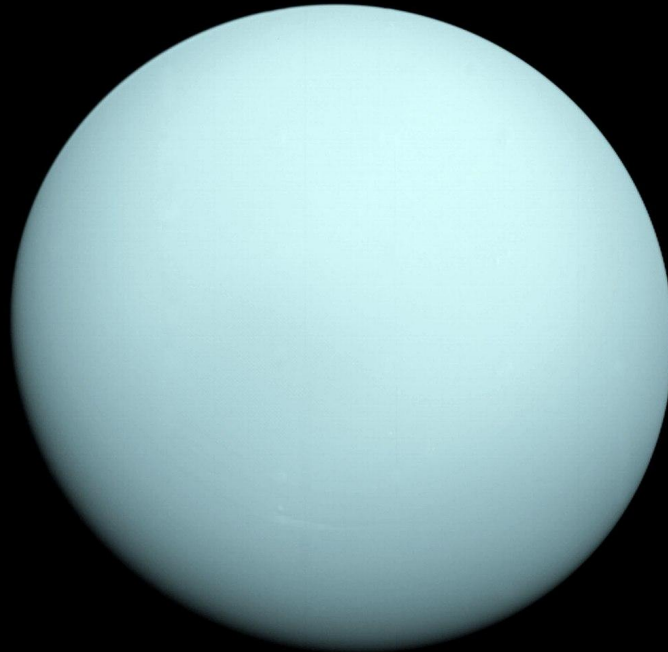


## Let's Get Started:

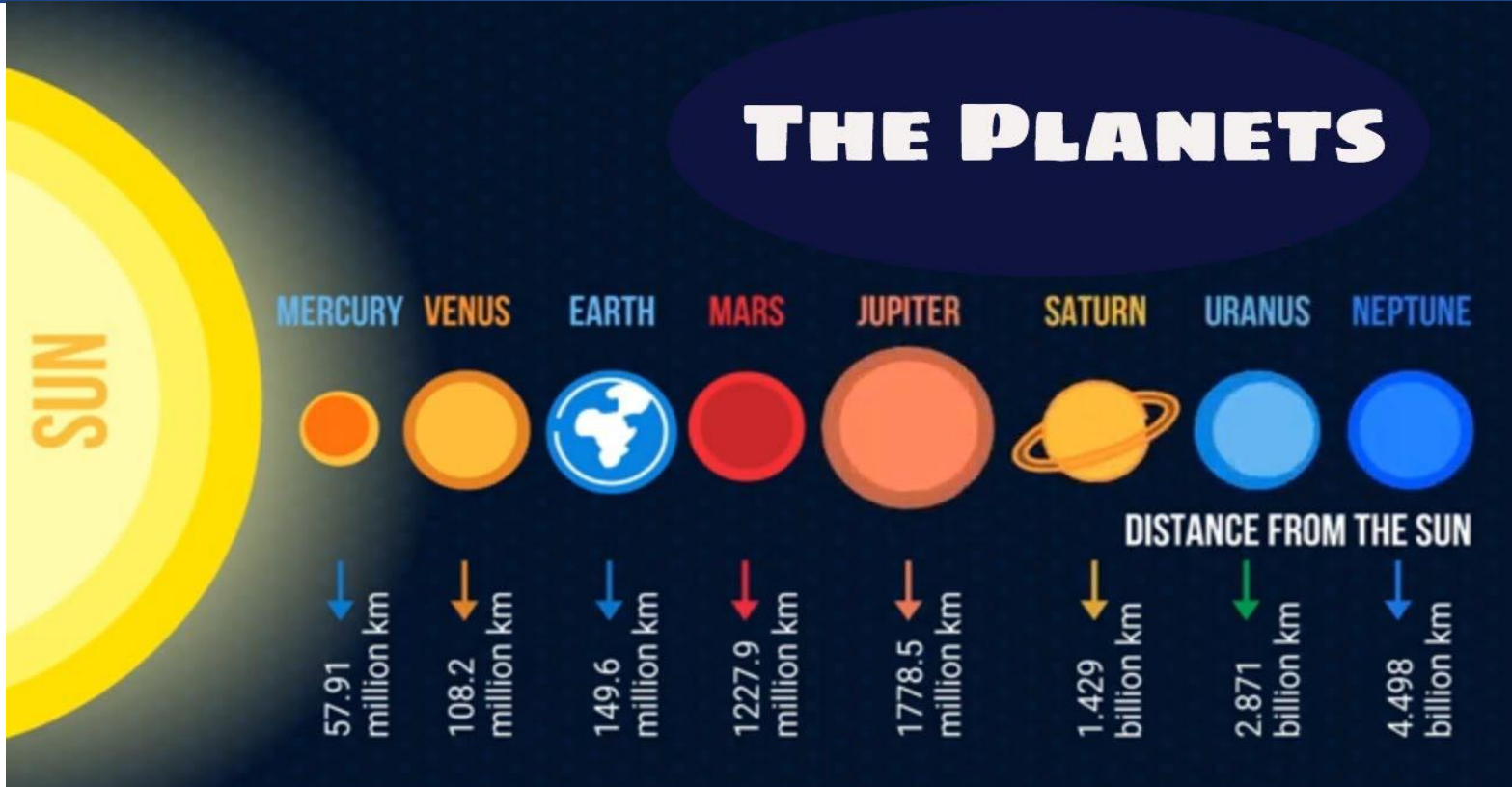
### Watch Videos:

- [Uranus 101 | National Geographic](#)
- [Uranus & Neptune: Crash Course Astronomy #19](#)

# Uranus



# THE PLANETS





Uranus is the seventh planet from the Sun and has the third largest diameter in our solar system. Uranus is very cold and windy. It is surrounded by 13 faint rings and 27 small moons as it rotates at a nearly 90-degree angle from the plane of its orbit. This unique tilt makes Uranus appear to spin on its side, orbiting the Sun like a rolling ball.

Uranus was the first planet found with the aid of a telescope, it was discovered in 1781 by astronomer William Herschel, although he originally thought it was either a comet or a star. It was two years later that Uranus was universally accepted as a new planet, because of observations by astronomer Johann Elert Bode.

William Herschel tried unsuccessfully to name his discovery Georgium Sidus after King George III. Instead the planet was named for Uranus, after the Greek god of the sky, as requested by Johann Bode.



Uranus has a radius of 15,759.2 miles and is 4 times wider than Earth.

Uranus is 19.8 astronomical units (AU) away from the Sun. One astronomical unit is the distance from the Sun to Earth. It takes sunlight 2 hours and 40 minutes to travel from the Sun to Uranus.



One day on Uranus takes about 17 hours, and it makes a complete orbit around the Sun (a year in Uranian time) in about 84 Earth years (30,687 Earth days).

Uranus is the only planet whose equator is nearly at a right angle to its orbit, with a tilt of 97.77 degrees. This could possibly be due to a collision with an Earth-sized object a long time ago. This unique tilt causes the most extreme seasons in the solar system. For nearly a quarter of each Uranian year, the Sun shines directly over each pole, plunging the other half of the planet into a 21-year-long, dark winter.

Uranus is also one of just two planets that rotate in the opposite direction than most of the planets (Venus is the other one), from east to west.

Uranus is one of two ice giants in our solar system (the other is Neptune). Most, at least 80% or more, of the planet's mass is made up of a hot dense fluid of "icy" materials such as water, methane and ammonia, which surrounds a small rocky core. Near the core, the temperature gets up to 9,000 degrees Fahrenheit.

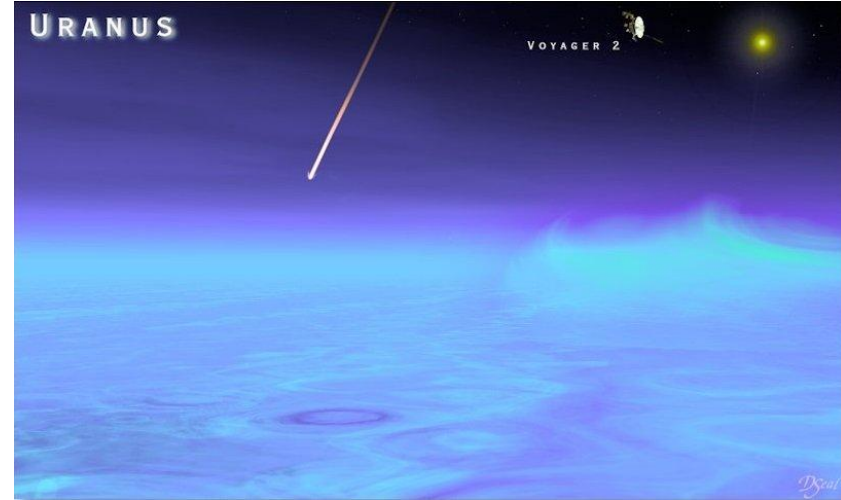
Uranus is slightly larger in diameter than Neptune, but is smaller in mass. It is the second least dense planet in our solar system. Saturn is the least dense of all.

Uranus gets its blue-green color from methane gas in the atmosphere. Sunlight passes through the atmosphere and is reflected back out by Uranus' top clouds. Methane gas absorbs the red portion of the light, resulting in a blue-green color.



Uranus took shape when the rest of our solar system formed about 4.5 billion years ago. Gravity pulled swirling gases and dust in to become this ice giant. Like its neighbor Neptune, Uranus likely formed closer to the Sun and moved to the outer solar system about 4 billion years ago, where it is now the seventh planet from the Sun.

As an ice giant, Uranus doesn't have a true surface. The planet is mostly swirling fluids. While a spacecraft would have nowhere to land on Uranus, it wouldn't be able to fly through its atmosphere without being damaged either. The extreme pressures and temperatures would easily destroy a metal spacecraft.





Uranus' atmosphere is mostly hydrogen and helium, with a small amount of methane and traces of water and ammonia. The methane gives Uranus its signature blue color.

Uranus' planetary atmosphere, with a minimum temperature of -371.56 degrees F, makes it even colder than Neptune in some places.

Wind speeds can reach up to 560 miles per hour on Uranus. Winds are retrograde at the equator, blowing in the reverse direction of the planet's rotation. But closer to the poles, winds shift to a prograde direction, flowing with Uranus' rotation.

Uranus has two sets of rings. The inner set of nine rings consists mostly of narrow, dark grey rings. There are two outer rings: the innermost one is reddish like dusty rings elsewhere in the solar system, and the outer ring is blue like Saturn's E ring.

In order of distance from the planet, the rings are called Zeta, 6, 5, 4, Alpha, Beta, Eta, Gamma, Delta, Lambda, Epsilon, Nu and Mu. Some of the larger rings are surrounded by belts of fine dust.

Uranus has 27 known moons. While most of the moons orbiting other planets get their names from Greek or Roman mythology, Uranus' moons are named for characters from the works of William Shakespeare and Alexander Pope.

Uranus' inner moons appear to be roughly half water ice and half rock. The composition of the outer moons remains unknown, but are believed to be captured asteroids.

Uranus' environment is probably not conducive to life as we know it. The temperatures, pressures and materials on this planet are most likely too extreme and volatile for organisms to adapt to.



# Uranus Understanding

1. How big is Uranus?
2. How far away is Uranus from the Sun?
3. How far away is Uranus from the Earth?
4. How long does it take light to travel from the Sun to Uranus?
5. How many moons does Uranus have?
6. How old is Uranus?