



Virtual Learning

# Aerospace Engineering

**Jupiter**

May 11, 2020



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## Lesson: May 11, 2020

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

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



## **Bell Work:**

How far away is Jupiter from Earth?



## Let's Get Started:

### Watch Videos:

- [Jupiter 101 | National Geographic](#)
- [Jupiter: Crash Course Astronomy #16](#)

# Jupiter



# THE PLANETS



Jupiter is the fifth planet from the Sun and is the largest planet in our solar system. It is more than twice as big as all of the other planets combined. Jupiter's stripes and swirls are actually cold, windy clouds of ammonia and water, swirling in an atmosphere of hydrogen and helium. Jupiter's Great Red Spot is a giant storm bigger than Earth that has gone on for hundreds of years.

Jupiter is surrounded by dozens of moons. It also has several rings, but unlike the famous rings of Saturn, Jupiter's rings are very hard to see and made of dust instead of ice.



Nine spacecraft have been sent to study Jupiter up close. NASA's Juno spacecraft is currently studying the planet from space. The spacecraft arrived at Jupiter in July 2016, and is the first to study the planet's cloud-shrouded interior. Scientists also use the Hubble Space Telescope and ground-based telescopes to regularly check in on Jupiter.

Pioneer 10 was the first spacecraft to fly past Jupiter. It was followed by Pioneer 11, Voyager 1 and Voyager 2 on flybys. The Galileo mission was the first to orbit Jupiter and send an atmospheric probe into the Jupiter's clouds. The international Ulysses mission used Jupiter's powerful gravity to hurl itself into orbit around the Sun's northern and southern poles.



Jupiter has a radius of 43,440.7 miles, and is 11 times wider than Earth.

Jupiter is 5.2 astronomical units (AU) away from the Sun. One astronomical unit is the distance from the Sun to Earth. It takes Sunlight 43 minutes to travel from the Sun to Jupiter.



Jupiter has the shortest day in our solar system. One day on Jupiter only takes about 10 hours. Jupiter makes a complete orbit around the Sun in about 12 Earth years (4,333 days).

Jupiter's composition is similar to the Sun, it is mostly hydrogen and helium. The deeper you go into the atmosphere, the pressure and temperature increases, compressing the hydrogen gas into a liquid. This gives Jupiter the largest ocean in our solar system, however it is an ocean made of hydrogen instead of water.

It is still unclear if deeper into Jupiter, it has a central core of solid material or if it is more like a thick, super-hot, dense soup. It's possible that it could be up to 90,032 degrees Fahrenheit there, made mostly of iron and silicate minerals (similar to quartz).

Jupiter does not have a true surface. The planet is mostly swirling gases and liquids. While a spacecraft would have nowhere to land on Jupiter, it wouldn't be able to fly through without damage either. The extreme pressures and temperatures deep inside Jupiter, would crush, melt and vaporize any spacecraft trying to fly into the planet.



Jupiter likely has three different cloud layers in its skies that together, span about 44 miles. The top cloud is most likely made of ammonia ice, while the middle layer is likely made of ammonium hydrosulfide crystals. The bottom layer might be made of water ice and vapor.

The colors that you see in thick bands across Jupiter are probably plumes of sulfur and phosphorus gases rising from the planet's warmer interior. Jupiter's fast rotation creates strong jet streams, separating its clouds into dark belts and bright zones across long stretches.

Jupiter has four large moons and many smaller moons that form a kind of miniature solar system. Jupiter has 53 confirmed moons and 26 provisional moons that are awaiting confirmation of discovery. Moons are named after they are confirmed.

Jupiter's four largest moons are Io, Europa, Ganymede and Callisto. They were first observed by the astronomer Galileo Galilei in 1610. He was using an early version of the telescope. These four moons are known today as the Galilean satellites. They are some of the most fascinating moons in our solar system. Io is the most volcanically active body in the solar system. Ganymede is the largest moon in the solar system. Callisto's very few small craters indicate a small degree of current surface activity. Europa appears to have a liquid-water ocean.

Jupiter's 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.

While Jupiter is unlikely to ever have life on it, the same is not true of some of its moons. Europa is one of the likeliest places to find life in our solar system. There is evidence of a vast ocean just beneath its icy crust, where life could possibly be supported.



# Jupiter Understanding

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