



Virtual Learning

# Aerospace Engineering

**Saturn**

May 12, 2020



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## Lesson: May 12, 2020

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

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



## **Bell Work:**

How far away is Saturn from Earth?

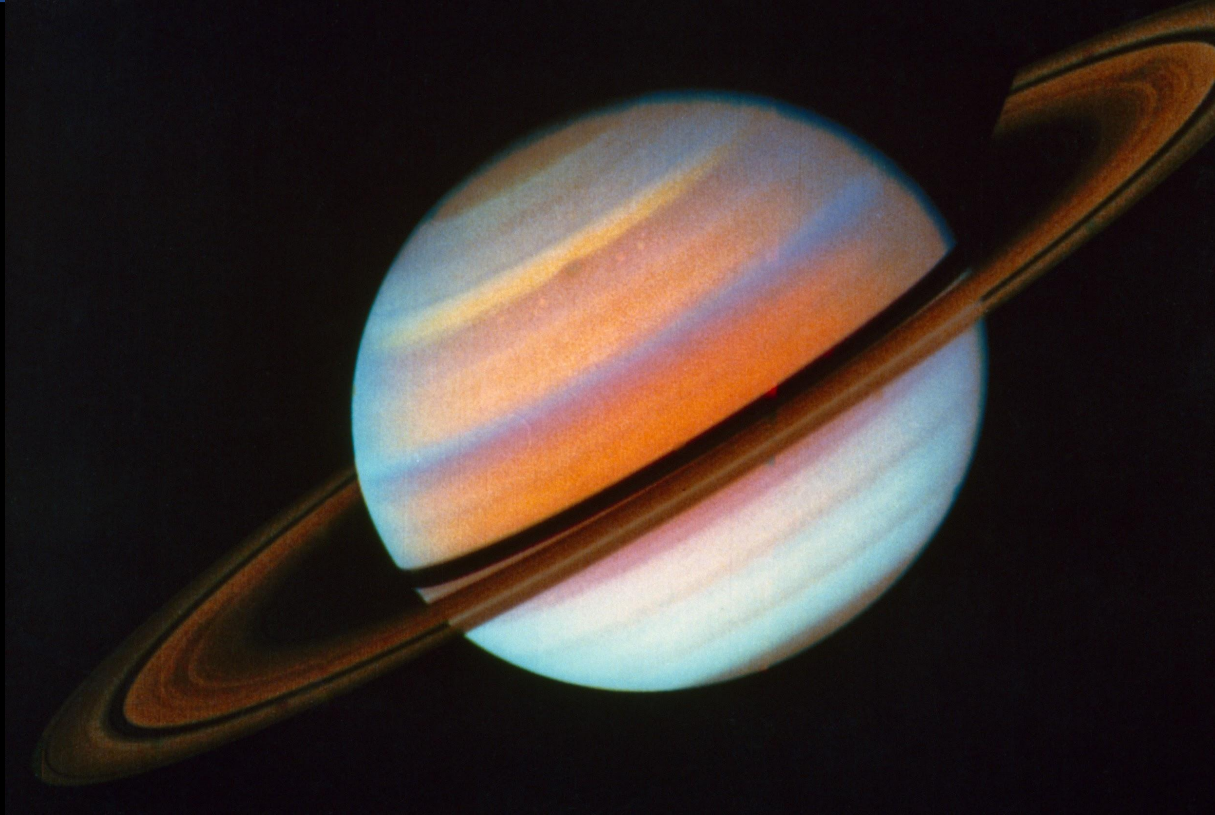


## Let's Get Started:

### Watch Videos:

- [Saturn 101 | National Geographic](#)
- [Saturn: Crash Course Astronomy #18](#)

# Saturn



# THE PLANETS





Saturn is the sixth planet from the Sun and the second largest planet in our solar system. Saturn is unique among the planets. It is not the only planet to have rings, but no other planet's rings are as complex as Saturn's. Like Jupiter, Saturn is a massive ball made mostly of hydrogen and helium.

Saturn has more than 60 known moons, and is home to some of the more interesting landscapes in our solar system.

Saturn is the farthest planet from Earth that was discovered by the human eye (no equipment used). The planet is named for the Roman god of agriculture and wealth, who was also the father of Jupiter.



Saturn has a radius of 36,183.7 miles, and is 9 times wider than Earth.

Saturn is 9.5 astronomical units (AU) away from the Sun. One astronomical unit is the distance from the Sun to Earth. It takes sunlight 80 minutes to travel from the Sun to Saturn.

Saturn has the second-shortest day in our solar system. One day on Saturn only takes only 10.7 hours, and it makes a complete orbit around the Sun (a year in Saturnian time) in about 29.4 Earth years (10,756 Earth days).



Just like Jupiter, Saturn is made up of mostly hydrogen and helium. Saturn's center is a dense core of metals like iron and nickel surrounded by rocky material and other compounds. It is surrounded by liquid metallic hydrogen inside a layer of liquid hydrogen, which is similar to Jupiter's core yet a lot smaller.

Saturn is the only planet in our solar system that its average density is less than water.

Saturn took shape when the rest of the solar system formed about 4.5 billion years ago. Gravity pulled swirling gases and dust in to form this gas giant. About 4 billion years ago, Saturn settled into its current position in our solar system, where it is the sixth planet from the Sun. Saturn is mostly made of hydrogen and helium, the same two main components that make up the Sun.

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



Saturn is covered with clouds that look like faint stripes, jet streams and storms. The planet is several different shades of yellow, brown and grey.

Winds in the upper atmosphere reach 1,600 feet per second. The strongest hurricane-force winds on Earth top out at about 360 feet per second. The atmospheric pressure is so powerful it squeezes gas into liquid.

Saturn's north pole has an interesting atmospheric feature, a six-sided jet stream. This hexagon-shaped pattern was first noticed in images from the Voyager I spacecraft and has been more closely observed by the Cassini spacecraft. Spanning about 20,000 miles across, the hexagon is a wavy jet stream of 200-mile-per-hour winds with a massive, rotating storm at the center. There is no weather feature like it anywhere else in the solar system.

Saturn's rings are thought to be pieces of comets, asteroids or shattered moons that were torn apart by Saturn's gravity before they reached the planet. The ring particles range in size from tiny, dust-sized icy grains to chunks as big as a house. Some of the particles are as large as mountains.

Saturn's ring system extends up to 175,000 miles from the planet. Named alphabetically in the order they were discovered, the rings are fairly close to each other, with the exception of a gap measuring 2,920 miles wide called the Cassini Division. The main rings are A, B and C. Rings D, E, F and G are fainter and more recently discovered.

Starting at Saturn and moving outward, there is the D ring, C ring, B ring, Cassini Division, A ring, F ring, G ring, and finally, the E ring.

Saturn'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 Saturn is unlikely to ever have life on it, the same is not true of some of its moons. Moons like Enceladus and Titan, home to internal oceans, could possibly support life.



# Saturn Understanding

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