

Grades: 6-8

Nova - The Planets: Saturn

NASA's Cassini explores Saturn for 13 years, looping through its icy rings and flying by its moons. The probe captures stunning ring-moon interactions, but when it finds the ingredients for life on the moon Enceladus, a bittersweet decision is made.

After watching this episode, choose from the following questions and/or tasks to extend your learning

Question Box 1

- What are the rings made out of and what produces the various colors?
- What is the internal heat source that powers the weather patterns in Saturn?
- Explain the formation of the huge planetary weather system nickname the Giant Hexagon?
- Explain the invisible boundary of Roche Limits on its gravitational forces.

Question Box 2

- What causes the gravitational pull of water?
- Voyager's journey brought intriguing images and showed the detailed composition of Saturn's atmosphere of Helium and Hydrogen gases.
- Explain the compressions and condensation of various gases in the formation of clouds in Saturn's atmosphere.
- What causes the gravitational forces in the core of Saturn if it only contains a gaseous atmosphere?
- What causes the size and color of the debris discs (rings)?
- Theorize the epochs of the formation of Saturn's ring and moons.
- Is Enceladus Moon's organic material plume a place that can support life?

Box 3 (Tasks)

- [Exploring Space Science Mathematics](#)

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Box 4 (Enrichment)

- Make a storyboard of SNOWLINE. What are the various temperatures and energy states at which water phases change?
- Explain in a PowerPoint the phase changes in regards to water's various properties described below.
- Because water seems so ubiquitous, many people are unaware of the unusual and unique properties of water, including:
 - Boiling Point and Freezing Point.
 - Surface Tension, Heat of Vaporization, and Vapor Pressure.
 - Viscosity and Cohesion.
 - Solid State.
 - Liquid State.
 - Gas State
- Listen to Gustav Holst's *The Planets, Mvmt V, Saturn, Bringer of Old Age*. Explain how Holst used the elements of music to capture the essence of the planet Saturn. What compositional devices and expressive qualities did Holst use that connects the music to the title of the movement; *Bringer of Old Age*.

Box 5 (Extend/Real-Life)

- CASSINI-Explain the amount of fuel used to propel the probe around the various planets.
- Make a model of the Earth's atmosphere and how it leads to various weather patterns.
- The cost of traveling to and from space is huge. Elon Musk saw this problem as an opportunity to create his company, SpaceX. As you watch these episodes of our solar system, ask yourself the following questions:
 - What's keeping mankind from doing more in space?
 - What opportunities does our solar system present?
 - What kind of careers/businesses might be needed in our future to take advantage of those opportunities?
- Collect answers to those questions after each episode. Let the information you gain from each episode spark your imagination and creativity. On Friday, you will put to use the ideas you've collected.