

The Galilean Moons of Jupiter - Activities (Ages 16-18)



Today we are going to investigate:

- The four largest moons of Jupiter
- Their significance in our understanding of the Solar System
- The surfaces of these moons
- Their physical characteristics

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Activities

The Galilean moons of Jupiter are the four largest moons of the giant planet. Find Jupiter in Night Sky and zoom in until you see these moons, their names are Callisto, Ganymede, Europa and Io. Discovered in 1610 by Galileo Galilei, they were the first moons found orbiting around another planet. Before this discovery most scholars believed in **geocentrism**, the theory that everything in the Universe orbited Earth.

Question: After his discovery, do you think Galileo thought geocentrism was still a viable theory? What alternative theory do you think he supported?

2

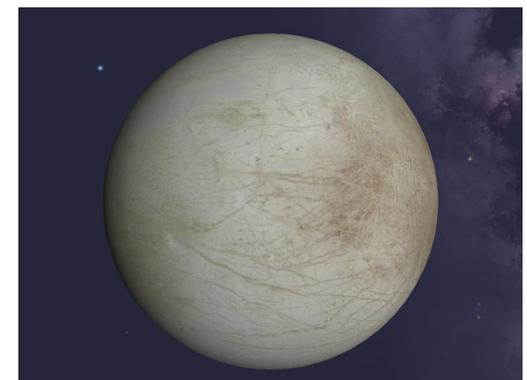
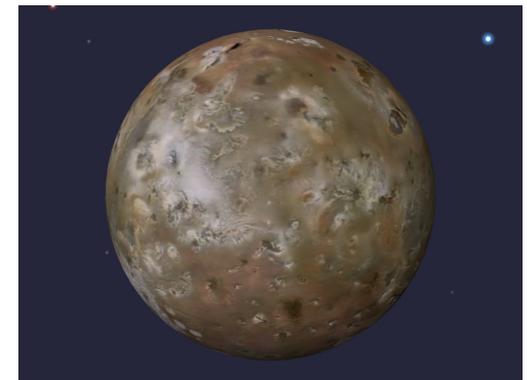
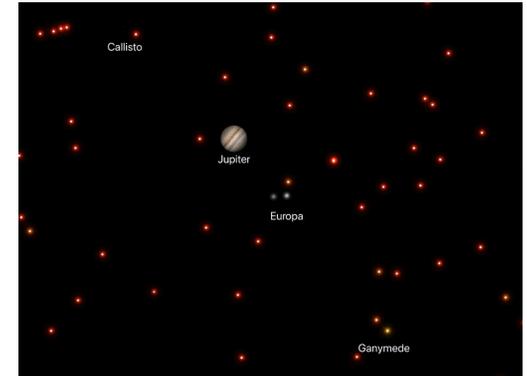
Tap on each of the moons in turn to examine the detailed 3D models. They vary in size from Europa, which is slightly smaller than Earth's Moon, to Ganymede which is slightly larger than the planet Mercury. Look at the moons' surfaces and evaluate how common impact craters are on each moon.

Question: Put the moons into order from least cratered to most cratered. How does this order compare to the moons' relative distances from Jupiter?

3

Impact craters on Solar System bodies can be erased by geological processes. These are driven by movements of molten material under the crust. Several of the Galilean moons have molten interiors. The molten material can be rock or water. These moons tend to have fewer impact craters.

Question: Can you decide which one of the Galilean moons is believed to have a cold and solid interior?



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Three of the moons have very similar internal compositions. They are essentially balls of water ice with cores of rock and metal. However, the other moon is almost entirely composed of silicates. It has a very hot interior with an ice-free surface largely covered with sulfur-based compounds. This moon is the most volcanically active body in the Solar System with over 400 erupting volcanoes.

Questions: What is the name of this volcanic moon?

5

This variation in the moons' surface types and geology was discovered by NASA's **Voyager** missions and greatly surprised scientists at the time. The moons were expected to have cold interiors and to be geologically dead. However, three of the moons clearly had warm interiors. Now planetary scientists believe they understand the physical process that generates heat inside the moons.

Question: Based on what you have seen so far which of these processes do you think is responsible for generating this heat?

- a) decay of radioactive elements
- b) tidal friction caused by Jupiter's gravity
- c) contraction of the moons' interiors
- d) electric currents induced by Jupiter's magnetic field

What we have discovered:

- The Galilean moons are the four largest moons of Jupiter
- Their discovery helped lead to the fall of geocentrism
- The moon's physical characteristics are related to their distances from Jupiter
- Three of the moons have icy compositions, the fourth is rocky and volcanic

