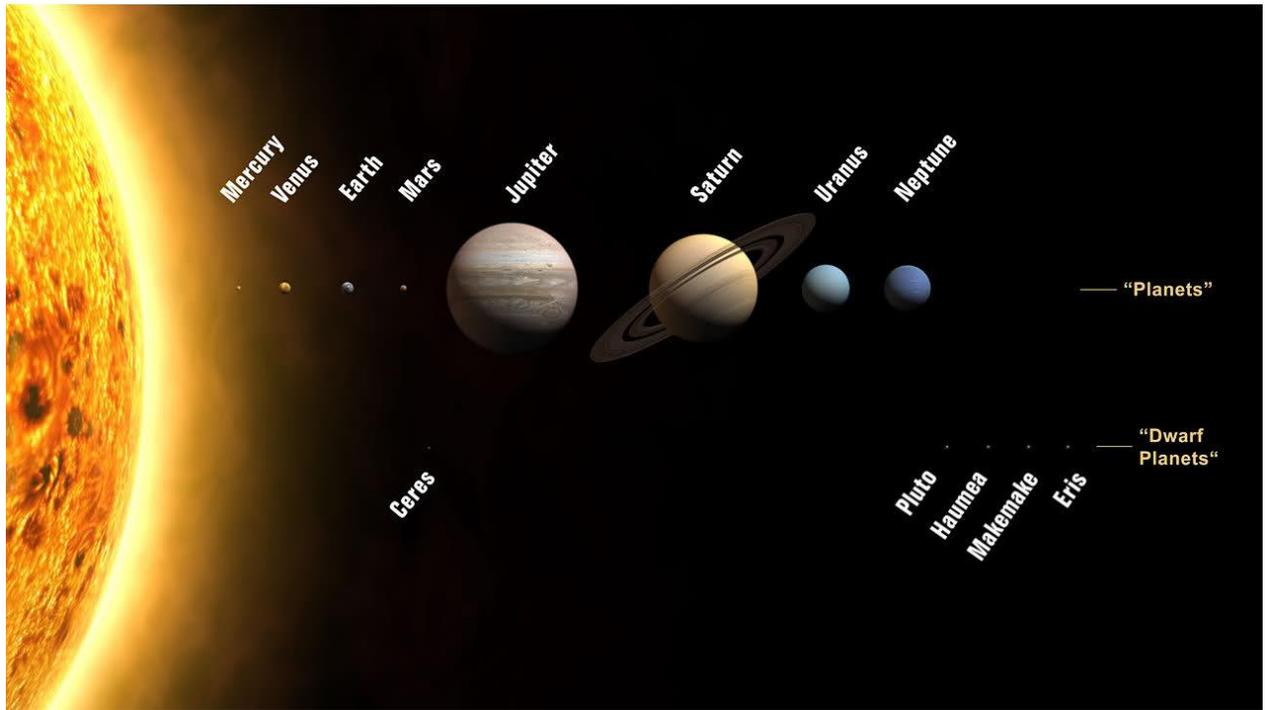


## Astronomy 101 The Solar System



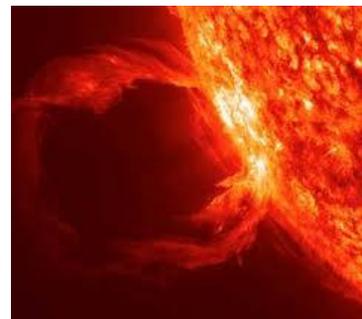
Did you know that – including major planets, ‘dwarf planets,’ and all their moons – there are nearly 200\* worlds orbiting our local star, the Sun (also known as “Sol”)?

Some of the worlds in our ‘Solar’ System include: a place so volcanically active it resurfaces itself every million years (Jupiter’s moon Io), one with a summit three times higher than Mount Everest (Olympus Mons on Mars) and one with a network of flowing rivers, lakes and seas (Saturn’s moon Titan).

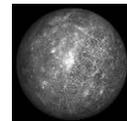
### A Solar System Snapshot:

**The Sun** contains most of the matter in our Solar System...roughly 99.9% of it. All those planets and moons – including even massive Jupiter – only account for the other 0.01%.

At nearly 1.4 million km in diameter, the Sun is basically a ball of helium and hydrogen that radiates heat and energy through nuclear fusion. Reactions at its core can take more than 170,000 years to reach the Sun’s surface.



Even though it's closest to the Sun, **Mercury** is not the hottest planet, but it *does* have the biggest temperature range in the solar system. For months, its sunlit side bakes at up to 430°C, while its dark side freezes at almost -150°C.



The thick atmosphere on **Venus** (more than 90 times denser than Earth’s) traps in so much heat from the Sun that the average temperature here is more than 460°C. The skies on Venus are almost always covered in a thick layer of thunderclouds full of lightning and sulphuric acid.



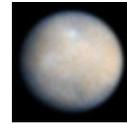
After more than two decades of looking at planets in our own Solar System and approximately 1,000 worlds around other stars, we haven't found any place even *somewhat* like **Earth**. Our home planet is the only one we know of with large amounts of liquid water, room temperature climates, comfortable surface pressure, and ample natural resources. In short, Earth is *still* the only place in the universe we know of that can support life as we know it. Earth's moon most likely formed during a titanic collision billions of years ago that either chipped off part of the Earth or formed near the Earth without becoming part of it.



With its near-24-hour-day, solid and liquid water, modest surface pressure, weather, and Earth-like geographical – as well as *geological* – features, **Mars** comes closer than any other world that we know of to being like Earth. While we humans haven't yet visited Mars in person, we have more human-made probes driving on and orbiting around the Red Planet than all the other worlds we've explored combined.



Spanning nearly 1,000 km in diameter, **Ceres** (pronounced SEER-ees) is largest of the "main-belt" asteroids orbiting between Mars and Jupiter and is now considered one of our Solar System's 5 dwarf planets.



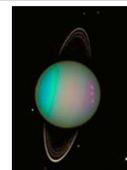
More than 1,300 times the size of Earth, **Jupiter** is a humongous ball of helium and hydrogen larger than all the other planets combined. This gas giant planet – made of materials more common to the Sun than the rocky inner planets – and its family of 67 known moons is like a miniature Solar System within our Solar System.



While all four gas giant planets have rings around them, **Saturn's** are by far the most visible. Trillions of particles of rock and ice make up this grand spectacle of nature – one of the most beautiful in all of astronomy. Like Jupiter, Saturn also has a *huge* number of moons: 62 at last count. The air on one of its moons – Titan – is closer in makeup to Earth's than anywhere else.



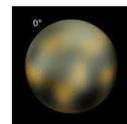
**Uranus** (pronounced YOU-ra-nus) was tipped on its side, with its north and south poles lying where most other planets have their equators after what scientists think was a titanic collision long ago. If you were to fly towards Uranus from Earth, you'd see its rings not as an edge-on sliver but as an in-your-face bulls-eye.



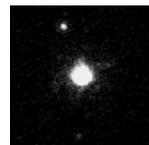
Sometimes called 'the last giant,' **Neptune** is only slightly smaller than Uranus and still dozens of times the size of Earth. Its large moon **Triton** has the coldest known surface in the Solar System.



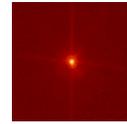
Made up of more of the icy materials of comets than the rock and iron ore of the inner planets, **Pluto** – once considered the ninth planet from our Sun – is now classified as a dwarf planet. NASA's New Horizons will be the first craft to visit and photograph Pluto and its moon **Charon** (nearly the size of Pluto itself) in 2015.



**Haumea** (pronounced haw-may-ah) is the only planet (dwarf or otherwise) not shaped like a sphere. This elliptical dwarf planet is twice as long (about 2,000 km) as it is wide (about 1,000 km.) It has two small moons and travels in an eccentric path between 5.1 and 7.7 billion km from the Sun (this takes it inside the path of Pluto for several decades during each of its 228 Earth-year orbits).



**Makemake** (pronounced maw-kay-maw-kay) was discovered in 2005 by U.S. astronomer Mike Brown and team, who also discovered Haumea and Eris in the same year. Like Haumea, dwarf planet Makemake's 5.8 to 7.9 billion km orbit sometimes takes it inside the path of Pluto.



Dwarf planet **Eris** (pronounced AIR-iss) is the farthest officially catalogued major object in our Solar System. Eris also has by far the wildest orbit, travelling as far as 14.6 billion km from the Sun, but venturing as close as 5.7 billion km, inside the orbits of Makemake, Haumea, and Pluto. A "year" on Eris is 561 Earth years long.



**Comets** are pebble-to-city-sized 'dirty snowballs' that develop their famous tails only when they venture close enough to the Sun for their ice to vaporize. Because most comets orbit tens or hundreds of billions of kilometres from the Sun, this process only happens for a select few comets.

Comets inhabit two areas of our extreme outer Solar System. One, the Kuiper belt, is a ring of comets near and beyond Pluto. The second – the Oort Cloud – is a hypothetical light-year wide bubble of trillions of comets that may exist in the space between our Solar System and the next star, more than 4 light years away.



### Top 5 crazy things about our Solar System:

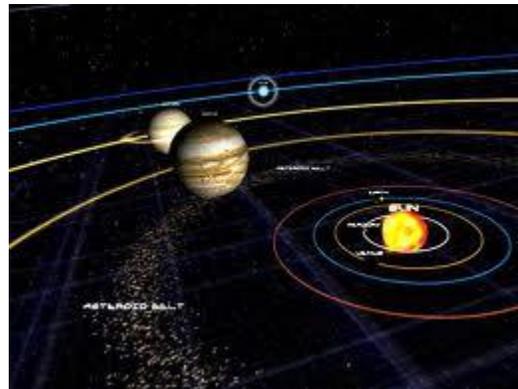
1. Our Solar System only has one star. While you might not think *that* sounds weird, most star systems in our galaxy have two, three, four, or even five stars orbiting a common centre of gravity.

2. The Sun and its family of planets and moons is about two thirds of the way toward the edge of our Milky Way (the majority of star systems in our galaxy are in the third nearest to its nucleus).

3. Our Solar System contains a *lot* of planets compared to the 1,000+ planetary systems we know of around other stars (this could be because we can't see well enough from Earth to notice *all* the planets around a given star).

4. Venus rotates 'backwards' on its axis compared to all the other planets in our Solar System. Also, its rotation is *super*-slow – about 260 times slower than Earth's rotation. As a result, a 'day' on Venus actually lasts longer than its 'year.'

5. All three newly-found dwarf planets were discovered in 2005...by the same researcher (Mike Brown) and his team. No other person in history has discovered more than one planet.



\* *about 200 worlds (192, to be exact) that we know of, as of November 2012*