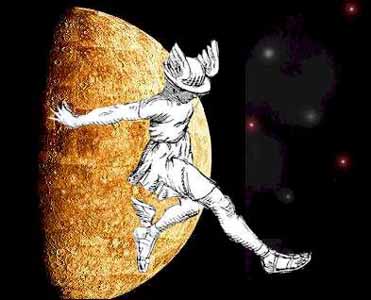
**Mercury**

Sun-scorched Mercury is only slightly larger than [Earth's Moon](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Moon). Like the Moon, Mercury has very little atmosphere to stop impacts, and it is covered with craters. Mercury's dayside is super-heated by the [sun](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun), but at night temperatures drop hundreds of degrees below freezing. Ice may even exist in craters.

Mercury speeds around the sun every 88 days, traveling through space at nearly 50 km (31 miles) per second -- faster than any other planet. One Mercury solar day equals 175.97 Earth days.

Mercury's elliptical orbit takes the small planet as close as 47 million km (29 million miles) and as far as 70 million km (43 million miles) from the [sun](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun). If one could stand on the scorching surface of Mercury when it is at its closest point to the sun, our star would appear more than three times as large as it does when viewed from [Earth](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Earth). Because Mercury is so close to the sun, it is hard to directly observe from Earth except during twilight.

**Temperatures** on Mercury's surface can reach 800 degrees Fahrenheit (427 degrees Celsius). Because Mercury's atmosphere is so thin, the surface cannot retain that heat so nighttime temperatures can drop to -290 degrees Fahrenheit (-179 degrees Celsius).

Mercury's thin **atmosphere**, or *exosphere*, is made up of atoms blasted off the surface by the solar wind and micrometeoroid impacts. Because of solar radiation pressure, the atoms quickly escape into space and form a tail of neutral particles. Though Mercury's magnetic field has just 1 percent the strength of Earth's, the field is very active. The magnetic field in the solar wind episodically connects to Mercury's field, creating intense magnetic tornadoes that funnel the fast, hot solar wind plasma down to the surface. When these ions strike the surface, they knock off neutral atoms and send them on a loop high into the sky where other processes may fling them back to the surface or accelerate them away from Mercury.

Mercury's surface resembles that of [Earth's Moon](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Moon), scarred by many impact craters resulting from collisions with [meteoroids](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Meteors) and [comets](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Comets). While there are areas of smooth terrain, there are also lobe-shaped scarps or cliffs, some hundreds of miles long and soaring up to a mile high, formed by contraction of the crust. The Caloris Basin, one of the largest features on Mercury, is about 1,550 km (960 miles) in diameter. It was the result of an [asteroid](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Asteroids) impact on the planet's surface early in the solar system's history. Over the next several billion years, Mercury shrank in radius about 1 to 2 km (0.6 to 1.2 miles) as the planet cooled after its formation. The outer crust contracted and grew strong enough to prevent magma from reaching the surface, ending the period of volcanic activity.

Mercury is the second densest planet after Earth, with a large metallic core having a radius of 1,800 to 1,900 km (1,100 to 1,200 miles), about 75 percent of the planet's radius. In 2007, researchers using ground-based radars to study the core found evidence that it is molten (liquid). Mercury's outer shell, comparable to Earth's outer shell (called the mantle), is only 500 to 600 km (300 to 400 miles) thick.

MERCURY, in the [solar system](http://kids.yahoo.com/science/space/article/solarsystem), the planet closest to the [sun](http://kids.yahoo.com/science/space/article/sun). Its mean distance from the sun is approximately 58 million km (about 36 million mi); its diameter is 4875 km (3030 mi); its volume and mass are about 1/18 that of the earth;and its mean density is approximately equal to that of the earth. Mercury revolves about the sun in a period of 88 days. Radar observations of the planet show that its period of rotation is 58.7 days, or two-thirds of its period of revolution. The planet, therefore, rotates one and a half times during each revolution. Because its surface consists of rough, porous, dark-colored rock, Mercury is a poor reflector of sunlight

Spectroscopic studies indicate that only an extremely thin atmosphere, containing sodium and potassium, exists on Mercury, its atoms apparently diffusing from the crust of the planet. Collisions with other protoplanets early in the history of the solar system may have stripped away lighter materials, thereby accounting for Mercury’s great density. The force of gravity on the planet’s surface is about one-third of that on earth’s surface.

[](http://www.google.com/imgres?hl=en&qscrl=1&rlz=1T4RNLC_enUS514US514&biw=1280&bih=588&tbm=isch&tbnid=Yz7h5ehfomPJ5M:&imgrefurl=http://www.wordsources.info/words-mod-planets.html&docid=qqHKjlpRh0i8NM&imgurl=http://www.wordsources.info/planet-venus-thumb.gif&w=158&h=205&ei=VYJtUaDGL4zC9QSD_IGYAQ&zoom=1&iact=hc&vpx=2&vpy=135&dur=1078&hovh=164&hovw=126&tx=49&ty=83&page=1&tbnh=129&tbnw=98&start=0&ndsp=26&ved=1t:429,r:0,s:0,i:82)**Venus**

Venus is a dim world of intense heat and volcanic activity. Similar in structure and size to Earth, Venus' thick, toxic atmosphere traps heat in a runaway "greenhouse effect." The scorched world has temperatures hot enough to melt lead. Glimpses below the clouds reveal volcanoes and deformed mountains. Venus spins slowly in the opposite direction of most planets.

Venus and [Earth](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Earth) are similar in size, mass, density, composition and gravity. There, however, the similarities end. Venus is covered by a thick, rapidly spinning atmosphere, creating a scorched world with temperatures hot enough to melt lead and a surface pressure 90 times that of Earth.

The Venusian year (orbital period) is about 225 Earth days long, while the planet's sidereal rotation period is 243 Earth days, making a Venus solar day (measured noon to noon) about 117 Earth days long. Resulting from this slow rotation Venus cannot generate a magnetic field similar to Earth's -- though its core iron content is similar to that of the Earth. (Venus' iron core is approximately 3,000 km [1,900 miles] in radius.) Venus rotates retrograde (east to west) compared with Earth's prograde (west to east) rotation. Seen from Venus, the sun would rise in the west and set in the east.

Venus' atmosphere consists mainly of carbon dioxide, with clouds of sulfuric acid droplets. Only trace amounts of water have been detected in the atmosphere. The thick atmosphere traps the sun's heat, resulting in surface **temperatures** higher than 880 degrees Fahrenheit (471 degrees Celsius). Probes that have landed on Venus survived only a few hours before being destroyed by the incredible temperatures. Sulfur compounds are abundant in Venus' clouds. The corrosive chemistry and dense, moving atmosphere cause significant surface weathering and erosion.

As Venus moves forward in its solar orbit while slowly rotating backwards on its axis, the top level of cloud layers zips around the planet every four Earth days, driven by hurricane-force winds traveling at about 360 km (224 miles) per hour. The wind speeds within the clouds decrease with cloud height, and winds at the surface are estimated to be just a few kilometers per hour. How this atmospheric super-rotation forms and is maintained continues to be a topic of scientific investigation.

Atmospheric lightning bursts, long suspected by scientists, were finally confirmed in 2007 by the European Venus Express orbiter. On Earth, Jupiter and Saturn, lightning is associated with water clouds, but on Venus, it is associated with clouds of sulfuric acid.

Venus lies much closer to the Sun than does our planet. That single fact has caused an unstoppable chain of events that doomed Venus to its fiery existence. Owing to its closer proximity to the Sun, Venus' temperature should have been only slightly warmer than that of the Earth. But as the planet warmed, the water evaporated. This increase in water vapor in the atmosphere began a cycle of global warming that could not be stopped. Water vapor is a very effective greenhouse gas. (Greenhouse gas soaks up hot air and prevents it from escaping into space). The increase in water vapor caused the temperature to rise further, which caused more water to evaporate, causing the temperature to climb still further.

Today it is likely that all of Venus' water has evaporated into the atmosphere. This atmosphere effectively traps the Sun's energy causing the surface to burn much hotter than it naturally would. The temperatures on Venus can reach almost 900 degrees Fahrenheit (approx 482 degrees Celsius).  
  
The Earth has a protective layer known as the Ozone Layer. This important shield protects the Earth from the Sun's ultraviolet radiation. Venus does not have an ozone layer. As a result, the ultraviolet radiation from the Sun finds its way directly into Venus' atmosphere. Over many billions of years this radiation has slowly broken down water molecules into hydrogen and oxygen. As a result, there is today very little water left on Venus.

**[](http://www.google.com/imgres?um=1&hl=en&sa=N&qscrl=1&rlz=1T4RNLC_enUS514US514&biw=1280&bih=588&tbm=isch&tbnid=Ti-4Un0GNPa-jM:&imgrefurl=http://geology.com/articles/what-is-earth-science.shtml&docid=t6IksDUY_hlZEM&imgurl=http://geology.com/articles/what-is-earth-science/earth-science.jpg&w=380&h=280&ei=QRVwUaWnLoak8gSR5YHQDQ&zoom=1&iact=hc&vpx=972&vpy=285&dur=546&hovh=193&hovw=262&tx=171&ty=146&page=2&tbnh=145&tbnw=190&start=20&ndsp=28&ved=1t:429,r:33,s:0,i:270)Earth**

Earth is an ocean planet. Our home world's abundance of water -- and life -- makes it unique in our solar system. Other planets, plus a few moons, have ice, atmospheres, seasons and even weather, but only on Earth does the whole complicated mix come together in a way that encourages life -- and lots of it.

Earth, our home planet, is the only planet in [our solar system](http://solarsystem.nasa.gov/planets/profile.cfm?Object=SolarSys) known to harbor life: life that is incredibly diverse. All the things we need to survive exist under a thin layer of atmosphere that separates us from the cold, airless void of space.

Earth is made up of complex, interactive systems that create a constantly changing world that we are striving to understand. From the vantage point of space we are able to observe our planet globally, using sensitive instruments to understand the delicate balance among its oceans, air, land and life. Satellite observations help study and predict weather, drought, pollution, climate change and many other phenomena that affect the environment, economy and society.

Earth is the third planet from the [sun](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun) and the fifth largest in our solar system. Earth's diameter is just a few hundred kilometers larger than that of [Venus](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Venus).

The four seasons are a result of Earth's axis of rotation being tilted 23.45 degrees with respect to the plane of Earth's orbit around the sun. During part of the year, the northern hemisphere is tilted toward the sun and the southern hemisphere is tilted away, producing summer in the north and winter in the south. Six months later, the situation is reversed. During March and September, when spring and fall begin in the northern hemisphere, both hemispheres receive roughly equal amounts of solar illumination.

Earth's global ocean, which covers nearly 70 percent of the planet's surface, has an average depth of about 4 km (2.5 miles). Fresh water exists in the liquid phase only within a narrow temperature span: 32 to 212 degrees Fahrenheit (0 to 100 degrees Celsius). This span is especially narrow when contrasted with the full range of temperatures found within the solar system. The presence and distribution of water vapor in the atmosphere is responsible for much of Earth's weather.

We are enveloped by an atmosphere that consists of 78 percent nitrogen, 21 percent oxygen and 1 percent other ingredients. The atmosphere affects Earth's long-term climate and short-term local weather, shields us from much of the harmful radiation coming from the sun and protects us from [meteors](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Meteors) as well: most of which burn up before they can strike the surface as meteorites. Earth-orbiting satellites have revealed that the upper atmosphere actually swells by day and contracts by night due to solar heating during the day and cooling at night.

Our planet's rapid rotation and molten nickel-iron core give rise to a magnetic field, which the solar wind distorts into a teardrop shape in space. (The solar wind is a stream of charged particles continuously ejected from the sun.) The Earth's magnetic field does not fade off into space, but has definite boundaries. When charged particles from the solar wind become trapped in Earth's magnetic field, they collide with air molecules above our planet's magnetic poles. These air molecules then begin to glow, and are known as the aurorae -- the northern and southern lights.

Earth's lithosphere, which includes the crust (both continental and oceanic) and the upper mantle, is divided into huge plates that are constantly moving. For example, the North American plate moves west over the Pacific Ocean basin, roughly at a rate equal to the growth of our fingernails. Earthquakes result when plates grind past one another, ride up over one another, collide to make mountains, or split and separate. The theory of motion of the large plates of the lithosphere is known as plate tectonics. Developed within the last 40 years, this explanation has unified the results of centuries of study of our planet.

**Mars**

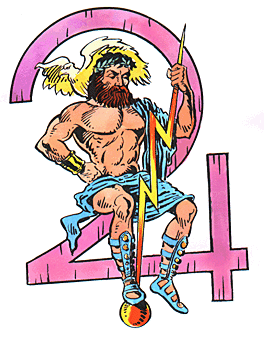
Mars is a cold desert world. It is half the diameter of Earth and has the same amount of dry land. Like Earth, Mars has seasons, polar ice caps, volcanoes, canyons and weather, but its atmosphere is too thin for liquid water to exist for long on the surface. There are signs of ancient floods on Mars, but evidence for water now exists mainly in icy soil and thin clouds.

Though details of Mars' surface are difficult to see from Earth, telescope observations show seasonally changing features and white patches at the poles. For decades, people speculated that bright and dark areas on Mars were patches of vegetation that Mars could be a likely place for life-forms and that water might exist in the polar caps. When the Mariner 4 spacecraft flew by Mars in 1965, many were shocked to see photographs of a bleak, cratered surface. Mars seemed to be a dead planet. Later missions, however, have shown that Mars is a complex member of the solar system and holds many mysteries yet to be solved.

Like Earth, Mars experiences seasons because of the tilt of its rotational axis (in relation to the plane of its orbit). Mars' orbit is slightly elliptical, so its distance to the [sun](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun) changes, affecting the Martian seasons. Mars' seasons last longer than those of Earth. The polar ice caps on Mars grow and recede with the seasons; layered areas near the poles suggest that the planet's climate has changed more than once. Volcanism in the highlands and plains was active more than 3 billion years ago, but some of the giant shield volcanoes are younger, having formed between 1 and 2 billion years ago. Mars has the largest volcanic mountain in the solar system, Olympus Mons, as well as a spectacular equatorial canyon system, Valles Marineris.

The cold temperatures and thin atmosphere on Mars don't allow liquid water to exist at the surface for long, and the quantity of water required to carve Mars' great channels and flood plains is not evident today. Unraveling the story of water on Mars is important to unlocking its climate history, which will help us understand the evolution of all the planets. Water is believed to be an essential ingredient for life; evidence of past or present water on Mars is expected to hold clues about whether Mars could ever have been a habitat for life.

The Martian atmosphere consists of carbon dioxide (95 percent), nitrogen (2.7 percent), argon (1.6 percent), oxygen (0.2 percent), and trace amounts of water vapor, carbon monoxide, and noble gases other than argon. The average atmospheric pressure at the surface is close to 4.6 torrs, which is 0.6 percent that on earth and equal to the pressure at a height of 35 km (22 mi) in earth’s atmosphere. Surface temperatures vary greatly with time of day, season, and latitude. Maximum summer temperatures may reach 290 K (63° F), but average daily temperatures at the surface do not exceed 240 K (–27° F). Due to the thinness of the atmosphere, daily temperature variations of 100° C (180° F) are common. Poleward of about 50° lat, temperatures remain cold enough (less than 150 K/–189° F) throughout winter for the atmosphere’s major constituent, carbon dioxide, to freeze into the white deposits that make up the polar caps. The total atmospheric pressure on the surface fluctuates by about 30 percent due to the seasonal cycle of the polar caps.   
  
The amount of water vapor present in the atmosphere is extremely slight and variable. The concentration of atmospheric water vapor is highest near the edges of the receding polar caps in spring. Mars is like a very cold, high-altitude desert. Surface temperatures are too cold and surface pressures too low for water to exist in the liquid state in most places on the planet. It has been suggested, however, that liquid water may exist just below the surface in a few localities.   
  
At certain seasons, some areas on Mars are subject to winds strong enough to move sand on the surface and to suspend dust in the atmosphere. A major weather event occurs in the southern hemisphere between late spring and early summer when Mars is near perihelion and the heating of southern equatorial latitudes is most intense. Dust storms begin to form, and some reach global proportions, obscuring the planet’s surface for weeks or even months. The dust entrained in these clouds is very fine and takes a long time to settle.

**Jupiter**

Jupiter, the most massive planet in our solar system -- with dozens of moons and an enormous magnetic field -- forms a kind of miniature solar system. Jupiter does resemble a star in composition, but it did not grow big enough to ignite. The planet's swirling cloud stripes are punctuated by massive storms such as the Great Red Spot, which has raged for hundreds of years.

Jupiter's appearance is a tapestry of beautiful colors and atmospheric features. Most visible clouds are composed of ammonia. Water vapor exists deep below and can sometimes be seen through clear spots in the clouds. The planet's "stripes" are dark belts and light zones created by strong east-west winds in Jupiter's upper atmosphere.

Most visible clouds are composed of ammonia. Water vapor exists deep below and can sometimes be seen through clear spots in the clouds. The planet's "stripes" are dark belts and light zones created by strong east-west winds in Jupiter's upper atmosphere. Dynamic storm systems rage on Jupiter. The Great Red Spot, a giant spinning storm, has been observed since the 1800s. In recent years, three storms merged to form the Little Red Spot, about half the size of the Great Red Spot.

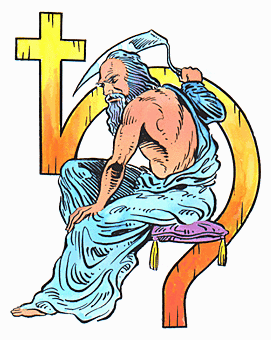
The composition of Jupiter's atmosphere is similar to that of the [sun](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun) -- mostly hydrogen and helium. Deep in the atmosphere, the pressure and temperature increase, compressing the hydrogen gas into a liquid. At depths of about a third of the way down, the hydrogen becomes metallic and electrically conducting. In this metallic layer, Jupiter's powerful magnetic field is generated by electrical currents driven by Jupiter's fast rotation. At the center, the immense pressure may support a solid core of rock about the size of Earth.

About 87 percent of Jupiter’s atmosphere is molecular hydrogen, H2, with helium, He, constituting most of the remaining 13 percent. The interior must have essentially the same composition as the atmosphere in order to yield the low observed density. It appears that this huge world is made mostly from the two lightest and most abundant elements in the universe, a composition similar to that of the sun and other stars. Jupiter may therefore represent a direct condensation of a portion of the primordial solar nebula—the great cloud of interstellar gas and dust from which the entire solar system formed about 4.6 billion years ago.

Jupiter radiates about twice as much energy as it receives from the sun. The source of this energy is apparently a very slow gravitational contraction of the entire planet, rather than the nuclear fusion that powers the sun. Jupiter would have to be almost 100 times larger to have enough mass to ignite a nuclear furnace.

Jupiter’s turbulent, cloud-filled atmosphere is cold, although the probe from the *Galileo* spacecraft in 1995 indicated a hotter, drier atmosphere than previously believed. With hydrogen so abundant, hydrogen-based molecules, such as methane, ammonia, and water, predominate. Periodic temperature fluctuations in Jupiter’s upper atmosphere reveal a pattern of changing winds like that in the equatorial region of earth’s stratosphere. Photographs of sequential changes in Jovian clouds suggest the birth and decay of giant cyclonic storm systems in the atmosphere; *Galileo*’s probe gave evidence of winds up to 644 km per hour (400 mph).

Ammonia freezes in the low temperature of Jupiter’s upper atmosphere (–125° C/–193° F), forming the white cirrus clouds—zones, ovals, and plumes—seen in many photographs of the planet transmitted by the *Voyager* spacecraft. At lower levels, ammonium hydrosulfide can condense. Colored by other compounds, clouds of this substance may contribute to the widespread tawny cloud layer on the planet. The temperature at the tops of these clouds is about –50° C (about –58° F), and the atmospheric pressure about twice the sea-level atmospheric pressure on earth. Through holes in this cloud layer, radiation escapes from a region where the temperature reaches 17° C (about 63° F). Still deeper, warmer layers have been detected by radio telescopes that are sensitive to cloud-penetrating radiation.

**Saturn**

Adorned with thousands of beautiful ringlets, Saturn is unique among the planets. All four gas giant planets have rings -- made of chunks of ice and rock -- but none are as spectacular or as complicated as Saturn's. Like the other gas giants, Saturn is mostly a massive ball of hydrogen and helium.

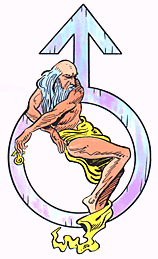
Like [Jupiter](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Jupiter), Saturn is made mostly of hydrogen and helium. Its volume is 755 times greater than that of [Earth](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Earth). Winds in the upper atmosphere reach 500 m (1,600 feet) per second in the equatorial region. (In contrast, the strongest hurricane-force winds on Earth top out at about 110 m, or 360 feet per second.) These super-fast winds, combined with heat rising from within the planet's interior, cause the yellow and gold bands visible in the atmosphere.

Though Saturn's magnetic field is not as huge as Jupiter's, it is still 578 times as powerful as the Earth's. Saturn, its rings and many of its satellites lie totally within Saturn's own enormous magnetosphere -- the region of space in which the behavior of electrically charged particles is influenced more by Saturn's magnetic field than by the solar wind. While the Hubble Space Telescope imaged Saturn's aurora in the ultraviolet, the Cassini spacecraft found that Saturn has a unique secondary aurora at the North Pole, imaged in the infrared in 2008. Aurorae occur when charged particles spiral into a planet's atmosphere along magnetic field lines. On Earth, these charged particles come from the solar wind. Cassini showed that at least some of Saturn's aurorae are like Jupiter's and are largely unaffected by the solar wind.

In many ways, Saturn is similar to Jupiter, but it is much smaller. It is the second largest planet in our Solar System and it is a gas giant like Jupiter. Under the clouds of methane, hydrogen and helium, the sky gradually turns into liquid until it becomes a giant ocean of liquid chemicals.

Saturn is the least dense planet in our Solar System. It is made up of mostly hydrogen and helium, which are the two lightest elements in the universe and thus make Saturn the lightest planet that we know of. This is why you wouldn't weigh as much on Saturn as you think you would because of its size. And because Saturn is so light, it does not have as much gravity. Interestingly, it is believed Saturn would actually be able to float in water because the hydrogen and helium that make up the planet are so lightweight.

Because Saturn is such a lightweight planet and it spins so fast, Saturn is not perfectly round like most of the other planets. Like Jupiter, Saturn is wider in the middle and more narrow near its top and bottom.

**Uranus**

Uranus is the only giant planet whose equator is nearly at right angles to its orbit. A collision with an Earth-sized object may explain Uranus' unique tilt. Nearly a twin in size to Neptune, Uranus has more methane in its mainly hydrogen and helium atmosphere than Jupiter or Saturn. Methane gives Uranus its blue tint.

Like [Venus](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Venus), Uranus rotates east to west. Uranus' rotation axis is tilted almost parallel to its orbital plane, so Uranus appears to be rotating on its side. This situation may be the result of a collision with a planet-sized body early in the planet's history, which apparently radically changed Uranus' rotation. Because of Uranus' unusual orientation, the planet experiences extreme variations in sunlight during each 20-year-long season.

[Voyager 2](http://solarsystem.nasa.gov/missions/profile.cfm?MCode=Voyager_2), the only spacecraft to visit Uranus, imaged a bland-looking sphere in 1986. When Voyager flew by, the south pole of Uranus pointed almost directly at the sun because Uranus was near its southern summer solstice, with the southern hemisphere bathed in continuous sunlight and the northern hemisphere radiating heat into the blackness of space.

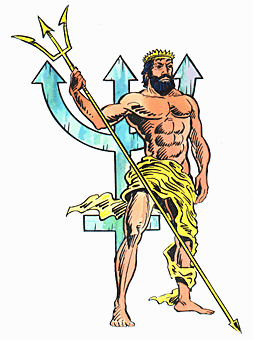
Uranus reached equinox in December 2007, when it was fully illuminated as the sun passed over the planet's equator. By 2028, the North Pole will point directly at the sun, a reversal of the situation when Voyager flew by. Equinox also brings ring-plane crossing, when Uranus' rings appear to move more and more edge-on as seen from Earth.

The [Hubble](http://solarsystem.nasa.gov/missions/profile.cfm?MCode=HST) Space Telescope and the Keck Observatory in Hawaii captured detailed images of Uranus as the planet approached equinox. While Voyager 2 saw only a few discrete clouds, more recent observations reveal that Uranus exhibits dynamic clouds as it approaches equinox, including rapidly evolving bright features and a new Great Dark Spot like those seen on Neptune.

Uranus is one of the two ice giants of the outer solar system (the other is [Neptune](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Neptune)). Uranus' atmosphere is mostly hydrogen and helium, with a small amount of methane and traces of water and ammonia. Uranus gets its blue-green color from methane gas in the atmosphere. Sunlight passes through the atmosphere and is reflected back out by Uranus' cloud tops. Methane gas absorbs the red portion of the light, resulting in a blue-green color. The bulk (80 percent or more) of the mass of Uranus is contained in an extended liquid core consisting mostly of icy materials (water, methane and ammonia).

For nearly a quarter of the Uranian year, the sun shines directly over each pole, plunging the other half of the planet into a long, dark winter.

While magnetic fields are typically in alignment with a planet's rotation, Uranus' magnetic field is tipped over: the magnetic axis is tilted nearly 60 degrees from the planet's axis of rotation, and is also offset from the center of the planet by one-third of the planet's radius. The magnetic fields of both Uranus and Neptune are very irregular.

**Neptune**

Dark, cold and whipped by supersonic winds, Neptune is the last of the hydrogen and helium gas giants in our solar system. More than 30 times as far from the sun as Earth, the planet takes almost 165 Earth years to orbit our sun. In 2011 Neptune completed its first orbit since its discovery in 1846.

Nearly 4.5 billion km (2.8 billion miles) from the [sun](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Sun), Neptune orbits the sun once every 165 years. It is invisible to the naked eye because of its extreme distance from Earth. Interestingly, the unusual elliptical orbit of the dwarf planet [Pluto](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Pluto) brings Pluto inside Neptune's orbit for a 20-year period out of every 248 Earth years. Pluto can never crash into Neptune, though, because for every three laps Neptune takes around the sun, Pluto makes two. This repeating pattern prevents close approaches of the two bodies.

The main axis of Neptune's magnetic field is tipped over by about 47 degrees compared with the planet's rotation axis. Like Uranus, whose magnetic axis is tilted about 60 degrees from the axis of rotation; Neptune's magnetosphere undergoes wild variations during each rotation because of this misalignment. The magnetic field of Neptune is about 27 times more powerful than that of Earth.

Neptune's atmosphere extends to great depths, gradually merging into water and other melted ices over a heavier, approximately Earth-size solid core. Neptune's blue color is the result of methane in the atmosphere. Uranus' blue-green color is also the result of atmospheric methane, but Neptune is a more vivid, brighter blue, so there must be an unknown component that causes the more intense color.

Despite its great distance and low energy input from the sun, Neptune's winds can be three times stronger than [Jupiter](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Jupiter)'s and nine times stronger than [Earth](http://solarsystem.nasa.gov/planets/profile.cfm?Object=Earth)'s. In 1989, Voyager 2 tracked a large, oval-shaped, dark storm in Neptune's southern hemisphere. This "Great Dark Spot," which was large enough to contain the entire Earth, spun counterclockwise, and moved westward at almost 1,200 km (750 miles) per hour. Subsequent images taken by the [Hubble](http://solarsystem.nasa.gov/missions/profile.cfm?MCode=HST) Space Telescope showed no sign of this Great Dark Spot, but did reveal the appearance and then fading of two other Great Dark Spots over the last decade. [Voyager 2](http://solarsystem.nasa.gov/missions/profile.cfm?MCode=Voyager_2) also imaged clouds casting shadows on a lower cloud deck, enabling scientists to visually measure the altitude differences between the upper and lower cloud decks.