I'm not a robot



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Introduction The planetary system we call home is located in an outer spiral arm of the Milky Way galaxy. Our solar system consists of our star, the Sun, and Neptune; dwarf planets such as Pluto; dozens of moons; and millions of asteroids.
comets, and meteoroids. Beyond our own solar system, there are more planets than stars in the Milky Way, with more planets being found. Most of the hundreds of billions of stars in our galaxy are thought to have planets of their own, and the Milky Way is
but one of perhaps 100 billion galaxies in the universe. While our planet is in some ways a mere speck in the vast cosmos, we have a lot of company out there. It seems that we live in a universe packed with planets - a web of countless stars accompanied by families of objects, perhaps some with life of their own. Namesake Namesake There are many
planetary systems like ours in the universe, with planets orbiting a host star. Our planetary system is called "the solar system is called "the solar system is called "the solar system extends much farther than the eight planets that orbit the
Sun. The solar system also includes the Kuiper Belt that lies past Neptune's orbit. This is a sparsely occupied ring of icy bodies, almost all smaller than the most popular Kuiper Belt that lies past Neptune's orbit. This is a sparsely occupied ring of icy bodies, almost all smaller than the most popular Kuiper Belt that lies past Neptune's orbit. This is a sparsely occupied ring of icy bodies, almost all smaller than the most popular Kuiper Belt Object - dwarf planet Pluto. NASA/JHUAPL/SwRI |
Full caption and image Beyond the fringes of the Kuiper Belt is the Oort Cloud. This giant spherical shell surrounds our solar system. It has never been directly observed, but its existence is predicted based on mathematical models and observations of comets that likely originate there. The Oort Cloud is made of icy pieces of space debris - some bigger
than mountains - orbiting our Sun as far as 1.6 light-years away. This shell of material is thick, extending from 5,000 astronomical units to 100,000 astronomical units to 100,000 astronomical units to 100,000 astronomical units. One astronomical units to 100,000 astronomical units to 100,000 astronomical units to 100,000 astronomical units.
influence, where orbiting objects can turn around and return closer to our Sun. The bulble created by the solar wind - a stream of electrically charged gas blowing outward from the Sun in all directions. The boundary where the solar wind is abruptly slowed by pressure from
interstellar gases is called the termination shock. This edge occurs between 80-100 astronomical units. Two NASA spacecraft launched in 1977 have crossed the termination shock. Voyager 1 in 2004 and Voyager 2 in 2007. Voyager 1 went interstellar in 2012 and Voyager 2 joined it in 2018. But it will be many thousands of years before the two
Voyagers exit the Oort Cloud. Moons Moons There are more than 200 known moons in our solar system and several more awaiting confirmation of discovery. Of the eight planets, Mercury and Venus are the only ones with no moons. The giant planets Jupiter and Saturn lead our solar system's moon counts. In some ways, the swarms of moons around
these worlds resemble mini versions of our solar system. Pluto, smaller than our own moon, has five moons in its orbit, including the Charon, a moon so large it makes Pluto wobble. Even tiny asteroids can have moons. In 2017, scientists found asteroid 3122 Florence had two tiny moons. These six narrow-angle color images were made from the first-
ever 'portrait' of the solar system taken by Voyager 1, which was more than 4 billion miles from Earth and about 32 degrees above the ecliptic. Credit: NASA Planetary Photojournal Formation Formation Our solar system formed about 4.5 billion years ago from a dense cloud of interstellar gas and dust. The cloud collapsed, possibly due to the
shockwave of a nearby exploding star, called a supernova. When this dust cloud collapsed, it formed a solar nebula - a spinning, swirling disk of material in. Eventually, the pressure in the core was so great that hydrogen atoms began to combine and form helium, releasing a tremendous amount of
energy. With that, our Sun was born, and it eventually amassed more than 99% of the available matter. Matter farther out in the disk was also clumping together. These clumps smashed into one another, forming larger and larger objects. Some of them grew big enough for their gravity to shape them into spheres, becoming planets, dwarf planets,
and large moons. In other cases, planets did not form: the asteroid belt is made of bits and pieces of the early solar system that could never quite come together into a planet. Other smaller leftover pieces became asteroids, comets, meteoroids, and small, irregular moons. Structure Structure The order and arrangement of the planets and other bodies
in our solar system is due to the way the solar system formed. Nearest to the Sun, only rocky material could withstand the heat when the solar system was young. For this reason, the first four planets - Mercury, Venus, Earth, and Mars - are terrestrial planets. They are all small with solid, rocky surfaces. Meanwhile, materials we are used to seeing as
ice, liquid, or gas settled in the outer regions of the young solar system. Gravity pulled these materials together, and that is where we find gas giants Jupiter and Saturn, and the ice giants Uranus and Neptune. The Solar System is the gravitationally bound system of the Sun and all celestial bodies that orbit it. This includes planets, moons, asteroids,
comets, dwarf planets, and countless particles of dust and ice. It is our cosmic neighborhood and the only planetary system known (so far) that supports life. Understanding the Solar System centers insight into planetary system known (so far) that supports life. Understanding the Solar System centers insight into planetary system centers insight into planetary system known (so far) that supports life.
around the Sun, a G-type main-sequence star. It contains 8 major planets, over 200 moons, and 5 officially recognized dwarf planets. Other objects include asteroids, comets, meteoroids, dust, and the solar wind. It extends far beyond Pluto, possibly beyond a light-year, into the Oort Cloud. The region encompassing the Sun and the planets has a
diameter of ~0.5 to 1 light-year. Including the Oort cloud, the Solar System's diameter is ~2 to 4 light-years. The Solar System formed about 4.6 billion years ago from a molecular cloud. The Sun's gravity and magnetic field dominate the dynamics of the system. Earth lies within the habitable zone, where liquid water can exist. The system is divided into
inner (rocky) planets, outer (gas/ice giants), and trans-Neptunian regions. The Solar System is the gravitationally bound system comprising the Sun and all natural objects that orbit it either directly or indirectly. This includes the eight planets, their moons, dwarf planets, small Solar System bodies (SSSBs), and the interplanetary medium of gas and
dust. The orbits of these bodies are governed primarily by the Sun's gravity. Including the Oort cloud, the size of the Solar System is around 2-4 light years in diameter. Here's a breakdown of the main components: A G2V main-sequence star containing over 99.8% of the Solar System's mass. Provides the energy that drives climate and supports life on
Earth.Mercury - Smallest, no significant atmosphere, closest to the Sun.Venus - Similar in size to Earth, thick CO2 atmosphere, extreme greenhouse effect. Earth - Only known life-bearing planet. Mars - Known as the Red Planet, home to the largest volcano in the Solar System. Jupiter - Largest planet, gas giant with dozens of moons. Saturn - Gas giant
famous for its extensive ring system. Uranus - Ice giant with a tilted rotational axis. Neptune - Farthest known major planets and dwarf planets. Largest is Ganymede (Jupiter), bigger than Mercury. Recognized by the IAU for not having cleared their orbits. Examples include: Pluto (Kuiper
Belt)Eris (scattered disk)Haumea (Kuiper Belt)Makemake (Kuiper Bel
plasma, solar wind, cosmic rays, and dust. The bubble-like region of space dominated by the solar wind, extending beyond Pluto. Kuiper Belt: Disk-shaped region beyond Neptune. Scattered Disk: Distant, elliptical orbits. Oort Cloud: Spherical shell of icy bodies, yet to be directly observed. This table provides a quick reference to key data for the major
planets and the dwarf planet Pluto. Object Distance from Sun (AU) Diameter (km) Orbital Period (Earth years) Notable Features Mercury 0.394,8790.24 No atmosphere, hottest planet Earth 1.0012,7421.00 Only known life-bearing planet Mars 1.526,7791.88 Evidence of past
waterJupiter 5.20142,98411.86Largest planet, over 90 moons Saturn 9.58120,53629.46Prominent rings, second-largest Uranus 19.2050,72484.01Rotates on its side, methane-rich Neptune 30.0749,244164.8Strong winds, dark storm systems Pluto ~39.52,377248Dwarf planet, icy, eccentric orbit Astronomers break the Solar System into three main
regions:Includes the terrestrial planets: Mercury, Venus, Earth, Mars.Dominated by rocky materials.Contains the Asteroid Belt.Includes the gas and ice giants: Jupiter, Saturn, Uranus, Neptune.Rich in volatile ices and gases.Hosts many moons and rings.Kuiper Belt: Source of short-period comets and dwarf planets.Scattered Disk: Highly eccentric
orbits.Oort Cloud (theorized): Home of long-period comets; extends up to 100,000 AU.CharacteristicDescriptionAge~4.6 billion yearsCentral BodySun (mass: 1.989 × 10<sup>30</sup> kg)ShapeMostly flat, disk-like with elliptical orbitsDominant ForcesGravity, angular momentum, solar radiationOrbital DirectionMost objects orbit counterclockwise (viewed from
above the North Pole)CompositionInner planets: rocky; outer planets: gas and ice giantsPlanets from the Sun, Earth, Jupiter, Saturn, Uranus, NeptuneRotation and RevolutionAll planets orbit the
Sun; each rotates at a different speed and tiltThe Solar System is not isolated. It exists within the Milky Way Galaxy, a barred spiral galaxy containing 100-400 billion stars. Situated in the Orion Spur), a minor spiral arm between the Sagittarius Arm and Perseus Arm. Approximately 27,000 light-years from the galactic center. The Solar
System orbits the center of the Milky Way at ~828,000 km/h (~514,000 mph). It takes roughly 225-250 million years to complete one orbit—this is known as a galactic year. The Sun also moves up and down through the galactic plane in a wave-like motion, which likely influence comet influx from the Oort Cloud. Nearest star system: Alpha Centauri,
about 4.37 light-years away. Nearest known exoplanet: Proxima Centauri b, in the habitable zone of Proxima Centauri. The most popular current theory of Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis, which proposes that the Solar System formation is the Nebular Hypothesis.
theory: Gravitational collapse led to the formation of the Sun at the center. Remaining material formed a protoplanetary disk. Planetesimals coalesced into planets through accretion and collision. Outer planets retained light gases due to cooler temperatures and greater mass. The Solar System is every-changing. Stable planetary orbits. Ongoing
evolution: asteroid impacts, solar variability, comet orbits. Technological exploration: satellites, probes, and telescopes. In the distant future, the Solar System looks very different: 5 billion years: Sun sheds outer layers and becomes a white dwarf. Outer planets likely becomes uninhabitable. 6-7 billion years: Sun sheds outer layers and becomes a white dwarf. Outer planets likely becomes a white dwarf. Outer planets likely becomes uninhabitable. 6-7 billion years: Sun sheds outer layers and becomes a white dwarf. Outer planets likely becomes uninhabitable.
remain intact, possibly escaping into interstellar space. Many stars have planets and other bodies, but there is a wide variation between them: Feature Solar Systems Number of Planets Many stars have planets and other bodies, but there is a wide variation between them: Feature Solar Systems Number of Planets Many stars have planets and other bodies, but there is a wide variation between them: Feature Solar Systems Number of Planets Many stars have planets Ma
circular, near-ecliptic planeOften elliptical, tilted orbitsHost StarG2V star (Sun)Various types (M-dwarfs common)Habitable ZoneWell-defined, Earth within itVaries greatly by star typeThe habitable zone or Goldilocks zone is the region around a star where temperatures allow liquid water to exist on a planet's surface. In our Solar System, this zone
spans roughly from 0.95 to 1.37 AU. EarthEarth is firmly within the habitable zone and maintains surface water thanks to a stable atmosphere and magnetic field. Venus (inner edge, but uninhabitable) Venus lies near the inner edge, but uninhabitable zone, but a runaway greenhouse effect makes it too hot for liquid water. Mars (outer edge, but uninhabitable) Venus lies near the inner edge, but uninhabitable zone, but a runaway greenhouse effect makes it too hot for liquid water. Mars (outer edge, but uninhabitable) Venus lies near the inner edge of the habitable zone and maintains surface water thanks to a stable atmosphere and magnetic field.
marginal)Mars lies near the outer edge of the habitable zone. It may have had surface water in the past, and may still have subsurface brines, but its thin atmosphere makes it too cold and dry today for stable liquid water. The habitable zone is not fixed—it shifts outward over time due to changes in solar luminosity: The Sun has grown brighter by
about 30% since its formation 4.6 billion years ago. Early Earth received less solar energy, yet still supported liquid water—this is known as the Faint Young Sun Paradox. As the Sun continues to age and brighten, the inner edge of the habitable zone will move outward. In about 1-1.5 billion years, Earth may become too hot to support complex
life.Eventually, Mars might temporarily lie within the habitable zone. Factors influencing habitability include: Star type and luminosity Planetary atmosphere Orbital stability Magnetic field and geologic activity Note that there are other possible regions within the Solar System potentially allowing liquid water and life. For example, liquid water exists on
some moons of gas giants. Human understanding of the Solar System has grown dramatically through centuries of observation and space exploration. Starting with early telescopic discoveries and culminating in robotic probes and rovers, we now have direct data from all major planetary bodies and even interstellar space. 1609: Galileo G
telescope to observe Jupiter's moons and Venus's phases.1781: William Herschel discovers Uranus.1930: Clyde Tombaugh discovers Pluto.1957: Sputnik 1, the first artificial satellite, is launched by the USSR.1969: Apollo 11 lands the first humans on the Moon.1971-1980s: Mars missions and Voyager probes begin mapping the outer
planets.MissionTarget(s)HighlightsVoyager 1 & 2Outer planets, heliosphereFirst flybys of Jupiter, Saturn, Uranus, Neptune; Voyager 1 entered interstellar space in 2012. Pioneer 10 & 11 Jupiter, Saturn Early flybys of the outer Solar System. Galileo Jupiter and its moons Detailed study of Jupiter and evidence of subsurface oceans. Cassini-Huygens Saturn
and TitanExplored Saturn's rings and delivered Huygens to Titan's surface. New HorizonsPluto and Kuiper BeltFirst flyby of Pluto (2015) and exploration of Arrokoth. Mars RoversMarsSpirit, Opportunity, Curiosity, and Perseverance explored Martian surface. JunoJupiter Studying Jupiter's atmosphere, magnetic field, and structure. Perseverance is
collecting samples on Mars for future return. Europa Clipper (launched 2024) plans on exploring Europa's subsurface ocean. Dragonfly (planned launch 2028) will send a rotorcraft to Titan. James Webb Space Telescope is identifying and characterizing exoplanets and distant Solar System objects. Why is Pluto no longer considered a planet? A: Pluto was
reclassified as a dwarf planet in 2006 because it does not "clear its orbit" of other debris. How far does the Solar System extend up to a light-year, including the Oort Cloud. What is the largest planet? A: Jupiter is the largest, with a diameter of about 142,984 km and mass over 300 times that of
Earth. Which planet has the most moons? A: As of 2025, Saturn has the most confirmed moons (over 145), followed closely by Jupiter. Could there be a ninth planet? A: Scientists hypothesize a "Planet Nine" based on unusual orbits of trans-Neptunian objects, but it hasn't been observed. Can life exist elsewhere in the Solar System? A: Possibly—moons (over 145), followed closely by Jupiter. Could there be a ninth planet? A: Scientists hypothesize a "Planet Nine" based on unusual orbits of trans-Neptunian objects, but it hasn't been observed. Can life exist elsewhere in the Solar System? A: Possibly—moons (over 145), followed closely by Jupiter. Could there be a ninth planet? A: Double or trans-Neptunian orbits of trans-Neptunian orbits orbi
like Europa, Enceladus, and Titan may harbor subsurface oceans or conditions favorable to microbial life. How do we explore the Solar System? A: At current spacecraft speeds, it takes decades
to reach the outer regions; Voyager 1 has traveled ~160 AU since 1977. Chrysostomou, A.; Lucas, P. W. (2005). "The Formation of Stars". Contemporary Physics. 46 (1): 29-40. doi:10.1080/0010751042000275277de la Fuente Marcos, C.; de la Fuente Marcos, R. (2024). "Past the outer rim, into the unknown: structures beyond the Kuiper Cliff".
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neighborhood. XXXIV. A search for planets orbiting nearby M dwarfs using astrometry". The Astronomical Journal. 148 (5): 91. doi:10.1088/0004-6256/148/5/91McKee, Christopher F.; Parravano, Antonio; Hollenbach, David J. (2015). "Stars, Gas, and Dark Matter in the Solar Neighborhood". The Astrophysical Journal. 814 (1): 24. doi:10.1088/0004
637X/814/1/13Related Posts Our solar system has eight planets, and five dwarf planets, and five dwarf planets, and five dwarf planets, and five dwarf planets, and about 4,000 comets are in our solar system has eight planets, and five dwarf planet
the galactic center. The Milky Way is a barred spiral galaxy. Our solar system has many worlds with many types of atmospheres. The four giant planets - and at least one asteroid - have rings. More than 300 robotic spacecraft have left Earth's orbit, and 24 U.S. astronauts have traveled to the Moon. So far, Earth is the only place we've found life in
our solar system. Our solar system includes Sun, planets, satellites, dwarf planets, asteroids, comets, etc. Let us briefly discuss the important members of the solar system is huge, at least 100 astronomical units in size (15 trillion km). It is held together by the sun's immense gravitational pull that keeps objects like the planets and
the asteroids in orbit around it. The sun is the biggest object in the solar system and provides energy to the earth by nuclear reactions that occur in its centre. The sun is a star and has a surface temperature of 6000 °C. It is mostly composed of Hydrogen gas along with a small amount of Helium gas. The solar system also contains 8 planets which are
large almost spherical objects that revolve around the sun in elliptical paths known as orbits. The earth is also one of the planets and lies at a distance from the sun such that it is neither too hot nor too cold for life to exist. The planets were formed at least 4.6 billion years ago when discs of dust and gas orbiting around the sun collapsed and clumped
together due to gravity. There are two kinds of planets: Rocky planets include Mercury, Venus, Earth, and Mars which are mostly made up of gases like Hydrogen, Helium, Methane, etc. These planets are very large in comparison to the rocky
planets. The solar system also contains small irregularly shaped objects made of rock, metal, and carbon called asteroid belt. To Know Awesome Facts About The Sun, Watch The Below Video: These are big chunks of rock or metal that are mostly found
orbiting the Sun between Mars and Jupiter. It is believed that these moons did not originally orbit Mars, but were instead a part of the Asteroid belt. The asteroid belt lies between Mars and Jupiter. It contains lumps of rock much smaller than planets. These lumps are called asteroids or minor planets. They are not visible from Earth with the naked
eye, but many may be seen through binoculars or small telescopes. Satellites are objects that revolve around planets and are also part of the solar system. The Earth's natural satellite is the Moon. Some satellites are objects that revolve around planets and are also part of the solar
system too, these satellites are man-made. These satellites are man-made. These satellites revolve around the earth much closer than the Earth's natural satellite of India. Some of them are INSAT, IRS, and EDUSAT. Comets are small irregularly shaped objects made up of ice. They
usually come from the outermost reaches of the solar system beyond Neptune from a region known as the Kuiper Belt. When these objects come close to the sun, the ice vaporizes forming a beautiful tail behind them. Some of these comets appear regularly such as the Halley's Comet which appears once every 76 years (the next time in year 2061!).
Dwarf planets are objects smaller than planets and larger than asteroids that orbit the sun at various places. The nearest dwarf planet to us is Ceres which lies in the asteroid belt. In 2014, Pluto and its 5 satellites were visited by a spacecraft named New
Horizons for the first time in history capturing images of the icy dwarf planet in high resolution. The solar system also contains 8 planets which are large almost spherical objects that revolve around the sun in elliptical paths known as orbits. The earth is also one of the planets and lies at a distance from the sun such that it is neither too hot nor too
cold for life to exist. There are two kinds of planets: Rocky planets include Mercury, Venus, Earth, and Mars which are mostly made up of gases like Hydrogen, Helium, Methane, etc. These planets are very large in comparison to the rocky
planets. Asteroids are big chunks of rock or metal that are mostly found orbiting the Sun between Mars and Jupiter. It is believed that these moons did not originally orbit Mars, but were instead a part of the Asteroid belt. Satellites are objects that revolve around planets and are also part of the solar system. The Earth's natural satellite is the Moon
Learning App! Put your understanding of this concept to test by answering a few MCQs. Click 'Start Quiz' to begin! Select the correct answer and click on the "Finish" buttonCheck your score and answering 0 out of 0 are correct 0 out of 0 are
Unattempted View Quiz Answers and Analysis When you gaze at the night sky, what do you see? A canvas of stars, perhaps the glow of the Moon, and maybe a bright dot that's actually a planet. But beyond what our eyes can capture, an astonishing system of celestial bodies is silently and elegantly orbiting our home star, the Sun. This system is not
only where Earth resides—it's our cosmic neighborhood, our origin story, and our gateway to understanding the universe itself. The solar system is far more than a collection of planets circling a star. It is a dynamic, evolving laboratory of cosmic history, stretching over 4.6 billion years. It contains everything from the Sun's blazing fusion furnace to icy
bodies on the fringes of space, and it offers endless fascination. With each planet, moon, asteroid, and comet, the solar system is, how it formed, what the solar system is a s
it contains, how it functions, and why it matters not just to astronomers and astronomers and astronomers and astronomers and astronomers and astronomers and astronomers, the dwarf planets like Pluto, hundreds of thousands of asteroids, and countless
comets and icy bodies that dwell in the farthest reaches. But it also includes the space between these bodies—a vacuum filled with magnetic fields, solar wind, cosmic dust, and energetic particles. Gravity is the architect of the solar system. It binds everything together in an intricate cosmic dust, and energetic particles. Gravity is the architect of the solar system. It binds everything together in an intricate cosmic dust, and energetic particles. Gravity is the architect of the solar system.
system's mass, dominates this gravitational choreography. Everything else, from gas giants to dust grains, moves in relation to it. The solar system is vast. Light from the Sun takes just over eight minutes to reach Pluto. And yet, this expanse is merely a drop in the ocean of the Milky Way galaxy, which houses
 hundreds of billions of stars. The solar system is our small, extraordinary corner of the cosmic metropolis. To understand what the solar system is, we must begin with how it came to be. Its story begins around 4.6 billion years ago, in a giant cloud of gas and dust called a solar nebula. This nebula, likely enriched with elements forged in ancient
supernovae, drifted through the galaxy until some event—perhaps a nearby star explosion—triggered its collapse under gravity. As the cloud collapsed, it spun faster and flattened into a swirling disk. At the center, matter condensed to form the proto-Sun, a massive ball of gas hot enough to eventually ignite nuclear fusion. Around it, particles of dust
and ice began sticking together, clumping into larger and larger bodies through a process known as accretion. Over millions of years, these clumps became planetesimals, and later protoplanets—the seeds of the worlds we know today. Closer to the Sun, where it was too hot for ice to remain solid, rocky planets like Earth and Mars formed. Farther
out, where it was colder, gas giants like Jupiter and Saturn captured thick envelopes of hydrogen and helium. This early solar system was chaotic—a place of collisions, migrations, and reshuffling. Some protoplanets were destroyed in massive impacts, while others merged to grow. Moons formed from debris, or were captured by gravity. Even now,
relics of this violent youth remain in the form of craters on the Moon and meteorites on Earth. Its mass is such that its
gravitational pull governs the motion of all other bodies within the solar system. The Sun shines because of nuclear fusion in its core, where hydrogen atoms are squeezed together to form helium, releasing immense energy in the process. This energy travels outward through radiation and convection layers before streaming into space as sunlight. It
 warms our planet, powers weather systems, and makes life possible. Beyond light and heat, the Sun emits a constant stream of charged particles known as the solar wind. This wind shapes planetary atmospheres and carves out a protective bubble in space called the heliosphere—a boundary where the influence of the Sun ends and interstellar space.
begins. Despite its apparent constancy, the Sun is dynamic and alive. Its surface roils with convection, magnetic fields tangle and snap to produce solar flares, and every eleven years from now, the Sun will exhaust its fuel and transform into a red giant, swallowing the inner planets
before ending its life as a white dwarf. But until then, it remains the luminous heart of our solar system. Eight major planets orbit the Sun, and no two are truly alike. They are traditionally divided into two categories: the four terrestrial planets—Mercury, Venus, Earth, and Mars—and the four gas and ice giants—Jupiter, Saturn, Uranus, and
Neptune. Mercury, the closest planet to the Sun, is a small, airless world scarred by craters. Venus, shrouded in clouds of sulfuric acid, has a hellish surface temperature hotter than Mercury despite being farther from the Sun. Earth, our home, is a marvel of life-supporting conditions, with liquid water, a magnetic field, and a dynamic atmosphere
Mars, the red planet, once had flowing rivers and lakes, and perhaps life, in its ancient past. Then come the gas giants—Jupiter and Saturn. Jupiter is the largest planet, with more mass than all the others combined. Its atmosphere is a roiling soup of storms, including the famous Great Red Spot, a hurricane-like vortex larger than Earth. Saturn is
known for its spectacular ring system, composed of countless icy particles, each orbiting the planet in its own miniature dance. Beyond them lie Uranus is tipped almost sideways, perhaps due to a massive impact long ago. Neptune is a dynamic world with the
fastest winds in the solar system and a faint system of dark rings. Each planet is accompanied by its own family of moons. From the volcanic hellscape of Io (orbiting Jupiter) to the icy ocean worlds of Europa and Enceladus, these moons are worlds in their own right—some potentially harboring life beneath their frozen crusts. Not all objects in the solar
system are planets. In 2006, the International Astronomical Union reclassified Pluto as a dwarf planet, sparking controversy and debate. But Pluto is not alone. It is one of a growing family of dwarf planet, sparking controversy and debate. But Pluto is not alone. It is one of a growing family of dwarf planet, sparking controversy and debate. But Pluto is not alone. It is one of a growing family of dwarf planet, sparking controversy and debate. But Pluto is not alone. It is one of a growing family of dwarf planets, including Eris, Haumea, and Makemake, orbiting the Sun in the Kuiper Belt, a vast region beyond Neptune filled with icy remnants of the early
solar system. Farther still lies the Oort Cloud, a hypothetical shell of icy bodies surrounding the solar system, believed to be the source of long-period comets. These regions are largely unexplored, but they represent the outermost frontiers of our solar system. Closer in, between Mars and Jupiter, lies the asteroid belt, home to millions of rocky bodies.
While most are small, one—Ceres—is large enough to be considered a dwarf planet. These asteroids, along with near-Earth objects that cross our planetary defense. Moons, or natural satellites, orbit many of the planets and vary dramatically in size, composition, and
history. Earth's Moon is unusually large relative to its planet and stabilizes our axial tilt, influencing tides and possibly the evolution of life. Jupiter has over 90 moons, some of which, like Europa and Ganymede, are ocean worlds encased in ice. Saturn's moon Triton
orbits in the opposite direction of Neptune's rotation—a clue that it was likely captured from elsewhere in the solar system. Planetary rings, like those around Saturn, are formed from countless particles of ice and rock, each orbiting in its own path. These rings are not permanent—they are constantly being shaped by gravity, collisions, and solar
radiation. Many planets also generate magnetospheres—regions of space dominated by a planet's magnetosphere shields us from solar and cosmic radiation. Jupiter's is the largest in the solar system and emits intense radiation that would fry unprotected electronics. Comets are icy bodies that originate from the outer solar
system. When they approach the Sun, their ices vaporize, creating glowing comas and tails that stretch millions of kilometers. Comets are time capsules from the solar system's formation, and studying them can reveal insights into the origin of water and organic molecules on Earth. Meteoroids are smaller chunks of rock or metal traveling through
space. When they enter Earth's atmosphere and burn up, they become meteors or "shooting stars." If they survive the journey to the ground, they're called meteorites. These relics are like cosmic postcards, bearing the chemical and isotopic fingerprints of early solar system processes. Interplanetary dust, too small to see, fills the solar system and
forms a faint glow called the zodiacal light, visible just before sunrise or after sunset under very dark skies. So far, Earth is the only known world to support life. But could life exist elsewhere in the solar system? Mars once had water on its surface and might have hosted microbial life. Europa and Enceladus have subsurface oceans that could harbor
life beneath their icy shells. Titan's methane lakes and organic-rich atmosphere raise questions about alternative biochemistries. Even Venus, with its extreme heat, has been considered as a possible host for aerial microbial life in its upper clouds, where conditions are less hostile. The search for life within the solar system is not just about curiosity—
it's about understanding our own origins. If life can arise independently more than once, it may be common throughout the universe. From Galileo's first telescope to modern spacecraft, humanity has transformed the solar system from a set of wandering lights to a vibrant collection of worlds. Probes like Voyager, still traveling beyond the heliosphere,
have revealed the outer planets. Rovers like Curiosity and Perseverance have traversed Martian landscapes, analyzing rocks for signs of ancient life. Missions like New Horizons, which flew by Pluto, and Juno, currently orbiting Jupiter, continue to rewrite what we know. Future missions aim to return samples from Mars, land on Europa, and explore
Titan's methane lakes with flying drones. Private companies and national agencies alike now look toward the Moon and Mars for future human exploration. The solar system, once unreachable, is becoming part of humanity's extended presence. The solar system is more than a collection of planets orbiting a star. It is a grand narrative of creation,
chaos, evolution, and potential. It is our home, our origin, and perhaps our future. From the fiery heart of the Sun to the edge of interstellar space, every object, every grain of dust, plays a role in this cosmic symphony. To understand the solar system is to understand ourselves—where we came from, what we are made of, and where
we might go. It's a story written in starlight, craters, and the silent pull of gravity, inviting us to look up, to wonder, and to explore. Love this? Share it and help us spark curiosity about science! Science Astronomy Ask the Chatbot a Question solar system, assemblage consisting of the Sun—an average star in the Milky Way Galaxy—and those bodies
orbiting around it: 8 (formerly 9) planets with more than 400 known planets with more than 400 known planets; comets and other icy bodies; and vast reaches of highly tenuous gas and dust known as the interplanetary medium. The solar system is part of the "observable universe," the region of space that humans car
information on the motions, properties, and compositions of the planets and smaller bodies has grown to immense proportions, and the edge of the known universe. Yet the solar system and its immediate outer boundary still represent the limit of
our physical reach, and they remain the core of our theoretical understanding of the cosmos as well. Earth-launched space probes and landers have gathered data on planets, moons, asteroids, and other instruments from below and above Earth's
atmosphere and to the information extracted from meteorites and from Moon rocks returned by astronauts. All this information is scrutinized in attempts to understand in detail the origin and evolution of the solar system—a goal toward which astronomers continue to make great strides.
system. Located at the centre of the solar system and influencing the motion of all the other bodies through its gravitational force is the Sun, which in itself contains more than 99 percent of the mass of the system. The planets, in order of their distance outward from the Sun, are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
Four planets—Jupiter through Neptune—have ring systems, and all but Mercury and Venus have one or more moons. Pluto had been officially listed among the planets since it was discovered in 1930 orbiting beyond Neptune, but in 1992 an icy object was discovered still farther from the Sun than Pluto. Many other such discoveries followed, including
an object named Eris that appears to be at least as large as Pluto. It became apparent that Pluto was simply one of the International Astronomical Union (IAU), the organization charged by the scientific community with classifying
astronomical objects, voted to revoke Pluto's planet approved by the IAU, see planet. Understand the relative size of the Sun, the Moon, and other solar system objects earn about the comparative size of various solar
system objects. See all videos for this articleAny natural solar system object other than one million asteroids, or minor planets, or bit between Mars and Jupiter in a nearly flat ring called the asteroid belt. The
myriad fragments of asteroids and other small pieces of solid matter (smaller than a few tens of metres across) that populate interplanetary space are often termed meteoroids to distinguish them from the larger asteroidal bodies. The solar system's several billion comets are found mainly in two distinct reservoirs. The more-distant one, called the
Oort cloud, is a spherical shell surrounding the solar system at a distance of Pluto's orbit. The other reservoir, the Kuiper belt, is a thick disk-shaped zone whose main concentration extends 30-50 AU from the Sun, beyond the orbit of Neptune but including a
portion of the orbit of Pluto. (One astronomical unit is the average distance from Earth to the Sun—about 150 million miles].) Just as asteroids can be regarded as rocky debris left over from the formation of the inner planets, Pluto, its moon Charon, Eris, and the myriad other Kuiper belt objects can be seen as surviving representatives
of the icy bodies that accreted to form the cores of Neptune and Uranus. As such, Pluto and Charon may also be considered to be very large comet nuclei. The Centaur objects, a population of comet nuclei having diameters as large as 200 km (125 miles), orbit the Sun between Jupiter and Neptune, probably having been gravitationally perturbed
inward from the Kuiper belt. The interplanetary medium—an exceedingly tenuous plasma (ionized gas) laced with concentrations of dust particles—extends outward from the Sun to about 123 AU. The solar system even contains objects from interstellar objects from interstellar space that are just passing through. Two such interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from interstellar objects have been observed. 'Oumuamua from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar system even contains objects from the Sun to about 123 AU. The solar sys
had an unusual cigarlike or pancakelike shape and was possibly composed of nitrogen ice. Comet Borisov was much like the comets of the solar system and Pluto, in a montage of images scaled to show the approximate sizes of the bodies
relative to one another. Outward from the Sun, which is represented to scale by the yellow segment at the extreme left, are the four rocky terrestrial planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant planets (Mercury, Venus, Earth, and Mars), the four hydrogen-rich giant giant
asteroids, and the icy bodies in the Kuiper belt move around the Sun in elliptical orbits in the same direction that the Sun rotates. This motion is termed prograde, or direct, motion that all these orbital motions are in a counterclockwise direction. In
striking contrast, the comet nuclei in the Oort cloud are in orbits having random directions, corresponding to their spherical distribution around the plane of the planets. The shape of an object's orbit is defined in terms of its eccentricity. For a perfectly circular orbit, the eccentricity is 0; with increasing elongation of the orbit's shape, the eccentricity.
increases toward a value of 1, the eccentricity of a parabola. Of the eight major planets, Venus and Neptune have the most circular orbits around the Sun, with 0.21; the dwarf planet Pluto, with 0.25, is even more eccentric. Another defining
attribute of an object's orbit around the Sun is its inclination, which is the angle that it makes with the plane of Earth's orbit, by comparison, is much more steeply inclined, at 17.1°. The orbits of the small bodies generally
have both higher eccentricities and higher inclinations than those of the planets. Some comets from the Oort cloud have inclinations greater than 90°; their motion around the Sun is thus opposite that travel around it. The Sun is orbited
by planets, asteroids, comets and other things. Planets and dwarf planets of the Solar System. Compared with each other, the sizes are correct, but the distances are not The Solar System is about 4.568 billion years old.[1] The Sun formed by gravity in a large molecular cloud. It is mainly hydrogen, which it converts into helium through nuclear
fusion. The planets are in a flattened orbiting disk. This disk was partly left over from the cloud that formed the Sun, plus other material as the Sun moved through space. Eventually, the gas and dust of the disk came together into planets. It is thought that almost all stars and their planets form this way. The Sun is a star. It makes up 99.9% of the
Solar System's mass.[2] This means that it has strong gravity. The other objects are pulled into orbit around the Sun. The Sun is mostly made out of hydrogen, and some helium and higher elements. All heavier elements, called metals in astronomy, account for less than 2% of the Sun's mass. Oxygen is about 1% of the Sun's mass. Iron (0.2%) is the
most plentiful of the other elements.[3] There are eight planets in the Solar System. From closest to farthest from the Sun, they are mostly made of rock and metal, and they are mostly solid. The last four planets are called
giant planets. This is because they are much larger than other planets, and the six largest known dwarf planets, and the planets, and the planets, and Venus have no moons, and Saturn has the
 largest number of moons. The Solar System also contains other things. There are asteroid belts, mostly between Mars and Jupiter. Further out than Neptune, there is the Kuiper belt and the scattered disc. These areas have dwarf planets, including Pluto, Makemake, Haumea, Ceres, and Eris. There are thousands of very small objects in these areas
There are also comets, centaurs, and interplanetary dust. In Ancient Greece, Aristarchus of Samos proposed the heliocentric model of the Solar System, where the Sun, is at the center of the known universe. He is sometimes known as the "Greek Copernicus".[4] Main article: Formation and evolution of the Solar System The formation and evolution of the Solar System.
the Solar System began 4.6 billion years ago with the gravitational collapse of a small part of a giant molecular cloud.[5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [5] Most of the collapse of a small part of a giant molecular cloud. [6] Most of the collapse of a small part of a giant molecular cloud. [6] Most of the collapse of a small part of a giant molecular cloud. [7] Most of the collapse of a small part of a giant molecular cloud. [8] Most of the collapse of a small part of a giant molecular cloud. [8] Most of the collapse of a small part of a giant molecular cloud. [8] Most of the collapse of a giant molecular cloud. [8] Most of the collapse of a giant molecular cloud. [8] Most of the collapse o
known as the nebular hypothesis, was developed in the 18th (1700s) century by Emanuel Swedenborg, Immanuel Kant, and Pierre-Simon Laplace. It has been adjusted by scientific disciplines such as astronomy, physics, geology, and planetary science. As our knowledge of space has grown, the models have been changed to account for the new
observations. The Solar System has evolved considerably since its initial formation. Some moons have formed from circling discs of gas and dust around their parent planets, while other moons are believed to have formed and were later captured by their planets. Others, such as the Earth's Moon, may be the result of giant collisions. Many collisions
between bodies have occurred, and have been important to the evolution of the Solar System. In the early stages, the positions of the planets sometimes shifted, and planets have switched places.[6][7] This planetary migration is thought to have been responsible for much of the Solar System's early evolution. Astronomers now think that the order of
the planets was not always as it is today. Knowing what we know today, we can see the Solar System it is not. Also we have noticed other oddities in the Solar System. Mars is smaller than it ought to be, and the asteroid belt
has been disturbed. So, astronomers have put forward the grand tack hypothesis. In it Jupiter was earlier closer to the Sun, and (for some unknown reason) moved out to its present position. The Earth's orbit around the Sun is nearly a perfect circle, but in a very slightly oval shaped orbit, an elliptical orbit. The other planets in the Solar System also
orbit the Sun in slightly elliptical orbits. Mercury has a more elliptical orbit than the others, and there is obviously some explanation for this. Some of the smaller objects orbit the Sun in the same direction.[8]:4-5 A full account of the planetary motion needs an account of the n-body problem, which
is not treated on this wiki. A page can be found on En wiki. Main article: History of astronomy For thousands of years, people had no need for a name for the "Solar System". They thought the Earth stayed still at the center of everything (geocentrism). The Greek philosopher Aristarchus of Samos suggested that there was a special order in the sky.[9]
Nicolaus Copernicus was the first to develop a mathematical system that described what we now call the "Solar System". This was called a "new system of the world". In the 17th century, Galileo Galilei, Johannes Kepler and Isaac Newton began to understand physics more clearly. People began to accept the idea that the Earth is a planet that moves
around the Sun, and that the planets are worlds, and that all worlds are governed by the same same physical laws. More recently, telescopes and space probes sometimes let us see details directly. All inner planets have surface features. The gas giants (as the name suggests) have surfaces whose make-up is gradually being discovered. Planetary
distances, not to scale In their order from the Sun. It took people many years of using telescopes to find the objects that go around the Sun. It took people many years of using telescopes to find the objects that go around the Sun. It took people many years of using telescopes to find the objects that go around the Sun. It took people many years of using telescopes to find the objects that were farthest away. New planets are the biggest objects that go around the Sun. It took people many years of using telescopes to find the objects that were farthest away.
planets have moons that orbit around them just as the planet orbit the Sun. There are over 400 of these moons in the Solar System. Pluto was discovered by American astronomer Clyde Tombaugh in 1930. It was declared the ninth planet of the Solar System. Pluto's planet status changed in 2006, when the International
Astronomical Union (IAU) decided on a definition of the word "planet" for the first time. By this definition, Pluto was not a planet due to its irregular orbit and size. Thus, Pluto did not fit in with the rest of the planets. So, the IAU defined a
new category called "dwarf planet", into which Pluto did fit, along with some other small Solar System bodies are sometimes called plutinos.[10] There is an unknown number of dwarf planets: Pluto Ceres Haumea Eris Makemake
Quaoar Sedna Orcus Gonggong There are a few main parts of the Solar System. Here they are in order from the Sun, with the planets numbered, and dwarf planets closest to the Sun are called the inner planets. They are small and dense
terrestrial planets, with solid surfaces. They are made up of mostly rock and metal with a distinct internal structure and a similar size. Three also have an atmosphere. The study of the four planets closest to the sun, all are rocky planets (1) Mercury
(2) Venus (3) Earth (4) Mars Asteroid belt region contains; (a) Ceres (the only dwarf planet in this region) Asteroids The outer planets: From left to right: Jupiter and Saturn are gas giants, while Uranus and Neptune are ice giants; (5) Jupiter (6) Saturn (7)
Uranus (8) Neptune Kuiper belt region contains; (b) Pluto (c) Orcus (d) Haumea (e) Makemake (f) Quaoar Kuiper belt objects and possibly other dwarf planets The Oort cloud is separate from the trans-Neptung
region, and much farther out. It contains the long-period comets. The plane of the ecliptic is defined by the Earth's orbit around this same orbital plane. The farther away from this plane a planet orbits, the more inclined is its orbit to the ecliptic. If you could look at the Solar System "edge on"
then all the planets would be orbiting more or less in the plane of the ecliptic. ↑ Connelly, James N.; et al. (2012). "The absolute chronology and thermal processing of solids in the Solar protoplanetary disk". Science. 338 (6107): 651-655. Bibcode: 2012Sci...338..651C. doi:10.1126/science.1226919. ISSN 0036-8075. PMID 23118187. S2CID 21965292.
1 More precisely, 99.86 of its known mass. The total mass of the bodies in the Oort cloud is not known. Jupiter and Saturn account for 90% of the remaining 0.14%. 1 Hansen, C.J.; Kawaler, S.A.; Trimble, V. (2004). Stellar interiors: physical principles, structure, and evolution (2nd ed.). Springer. pp. 19-20. ISBN 978-0-387-20089-7. 1 Draper J.W.
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120504344. Wikimedia Commons has media related to Solar System. Views of the Solar System Your Weight on Other Worlds The Planets in the Solar System Archived 2021-07-10 at the Wayback Machine The English Wikibooks has more information on: Wikijunior: Solar System Retrieved from " 24 Vesta 4 Vesta seen by Dawn spacecraft July 9,
2011DiscoveryDiscovered byHeinrich Wilhelm OlbersDiscovery dateMarch 29, 1807DesignationsAlternative namesnoneMinor planet categoryMain belt (Vesta family)Orbital characteristicsEpoch November 26, 2005 (JD 2453700.5)Aphelion384.72 Gm (2.572 AU)Perihelion321.82 Gm (2.151 AU)Semi-major axis353.268 Gm (2.361
AU)Eccentricity0.08902Orbital period1325.46 d (3.63 a)Average orbital speed19.34 km/sMean anomaly205.652°Inclination7.133°Longitude of ascending node103.926°Argument of perihelion150.297°Physical characteristicsDimensions578×560×458 km[1]Mass2.7×1020 kg[2]Mean density3.4 g/cm³Surface gravity0.22 m/s²Escape velocity0.35
km/sRotation period0.2226 d[3]Albedo0.423 (geometric)[4]Temperaturemin: 85 K (-18 °C)[5]Spectral typeV-type asteroid[6]Apparent magnitude 5.1[7] to 8.48Absolute magnitude 5.1[7] to 8.48Absolute magnitude (H)3.20[4]Angular diameter 0.64" to 0.20" For the sports club in Uppsala, Sweden, see IF Vesta. 4 Vesta (IPA: ['vɛstə]) is the second most massive
asteroid in the solar system, with an average diameter of about 530 km (around 330 miles) and the entire asteroid belt. Its size and unusually bright surface makes Vesta the brightest asteroid, and the only one ever visible to the naked eye from Earth. Vesta's astronomical symbol is . Size comparison: the first
10 asteroids shown compared to Earth's Moon. Vesta is fourth from the left. Vesta was discovered by the German astronomer Heinrich Wilhelm Olbers on March 29, 1807. He allowed the prominent mathematician Carl Friedrich Gauss to name the asteroid after the Roman virgin goddess of home and hearth, Vesta. After the discovery of Vesta in 1807
no asteroids were discovered for the next 38 years. During this time the four known asteroids were counted among the planets, and each had its own planetary symbol. Vesta was represented by a stylized hearth, currently . Old graphic variants include , and Symbol of Vesta. The modern form is a simplification of the last.[8] Elevation map of 4 Vesta
seen from the south-east, showing the south pole crater. As determined from Hubble Space Telescope images of May 1996. Vesta is the second-most massive body in the asteroid belt. Vesta does have a different interior compared to its surface.[9] It is in the Inner Main Belt, at a distance of about 2.50 AU. It is similar to 2 Pallas in volume, but
somewhat more massive. Vesta's shape is close to the shape of a sphere by its own gravity,[10] but the large concavity and lump at the pole (see 'Surface Features' below) did not fit the criteria for being considered a planet in the future, if it is
convincingly determined that its shape is from hydrostatic equilibrium. Its rotation is fast for an asteroid (5.342 h) and prograde, with the north pole pointing in the direction of right ascension 20 h 32 min, declination +48° with an uncertainty of about 10°. This gives an axial tilt of 29°.[10] Temperatures on the surface are about -20°C with the Sun
overhead, dropping to about -190°C at the winter pole. Typical day-time and night-time temperatures are -60°C and -130°C, respectively. This estimate is for May 6, 1996, very close to perihelion, while details vary somewhat with the seasons.[11] For Vesta, there is a large collection of possible samples available to scientists, in the form of over 200
HED meteorites, giving insight into Vesta's geologic history and structure. Vesta is thought to consist of a metallic iron-nickel core, with a rocky olivine mantle, and a surface crust. From the first appearance of Ca-Al-rich inclusions (the first solid matter in the Solar System, forming about 4567 million years ago), a likely timeline is as follows:[12][13]
[14] Accretion completed after about 2-3 million years. Complete or almost complete melting due to radioactive decay of 26Al, leading to separation of the metal core at about 4-5 million years. Complete melting due to radioactive decay of 26Al, leading to separation of the metal core at about 4-5 million years.
Extrusion of the remaining molten material to form the crust. Either as basaltic lavas in progressive eruptions, or possibly forming a short-lived magma ocean. The deeper layers of the crust crystallize to form plutonic rocks, while older basalts are metamorphosed due to the pressure of newer surface layers. Slow cooling of the interior. Vesta is the
only known intact asteroid that has been resurfaced in this way. However, the presence of iron meteorites and achondritic meteorites and achondritic meteorites and achondritic meteorites and there once were other differentiated planetesimals with igneous histories, which have since been broken by impacts. 4 Vesta and 1 Ceres alongside Earth's Moon.
Some Vestian surface features have been resolved using the Hubble Space Telescope and ground based telescopes, e.g. the Keck Telescope. The most notable surface feature is a very large crater that is 460 km in diameter centered near the south pole.[10] Its width is about 80% of the entire diameter of Vesta. The floor of this crater is about 13 km.
below, and its rim rises 4-12 km above the surrounding area, with total surface relief of about 25 km. A central peak rises 18 km above the crater floor. It is thought that the impact responsible blew up about 1% of the entire volume of Vesta, and it is likely that a group of smaller asteroids known as the Vesta family are the remains of this collision. If
this is the case, then the fact that 10 km fragments of the Vesta family have survived bombardment until the present indicates that the crater is only about 1 billion years old or younger.[15] It would also be the original site of origin of the HED meteorites. In fact, all the known V-type asteroids taken together account for only about 6% of the ejected
volume, with the rest presumably either in small fragments, ejected by approaching the 3:1 Kirkwood gap, or perturbed away by radiation pressure. Spectroscopic analyses of the Hubble images 151 have shown that this crater has penetrated deep through several distinct layers of the crust, and possibly into the mantle which is indicated by spectral
signatures of olivine. Interestingly Vesta was not disrupted nor resurfaced by an impact of this magnitude. Several other large craters about 200 km across has been named Olbers in honour of Vesta's discoverer, but it does not appear in elevation maps as a fresh crater would, and its
nature is presently unknown, perhaps an old basaltic surface.[16] It serves as a reference point with the 0° longitude prime meridian defined to pass through its center. The eastern hemispheres show markedly different terrains. From preliminary spectral analyses of the Hubble Space Telescope images,[15] the eastern hemisphere
appears to be have a highly reflective, heavily cratered "highland" terrain with old, dusty rocks, and craters probing into deeper plutonic layers of the crust. On the other hand, large regions of the western hemisphere are taken up by dark geologic units thought to be surface basalts. Various small solar system objects are believed to be fragments of
Vesta caused by collisions. The Vestoid asteroids and HED meteorites are examples. The V-type asteroid 1929 Kollaa has been determined to have a composition like cumulate eucrite meteorites are believed to be Vestian fragments, Vesta is currently one of only five
identified Solar system bodies for which we have physical samples, the others being Mars, the Moon, comet Wild 2, and Earth itself. Proof of HED meteorites which orbited Vesta in the asteroid belt for 10 months.[18] Vesta is the source of the HED meteorites, which are about 6% of all the meteorites which
fall to Earth. These meteorites have pyroxene, which is a mineral rich in iron and magnesium. This has been matched exactly to the mineral signatures on Vesta's surface captured by Dawn's instruments. [18] Vesta is seen from San Francisco on June 14, 2007. Its size and unusually bright surface make Vesta the brightest asteroid, and it is occasionally
visible to the naked eye from dark (non-light polluted) skies. Recently, in May and June 2007, Vesta reached a peak magnitude of +5.4, the brightest since 1989.[19] At that time, opposition and perihelion were only a few weeks apart. It was visible in the constellations Ophiuchus and Scorpius.[20] Less favourable oppositions during late autumn in the
Northern Hemisphere still have Vesta at a magnitude of around +7.0. Even when in conjunction with the Sun, Vesta will have a magnitude around +8.5; from a pollution-free sky it can be observed with binoculars even at elongations much smaller than near opposition. [21] ↑ P. C. Thomas et al. Impact excavation on asteroid 4 Vesta: Hubble Space
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| 250 | 500)Asteroid (← links | change) Comet (← links | change) Earth (← links | change) Uranus (← links | change) Uranus (← links | change) Wenus (← links | change) Natural satellite (← links | change) Solar System (← links | change) Solar System (← links | change) Solar System (← links | change) Uranus (← links | change) Ur

 $links \mid change)$ Moons of Saturn ($\leftarrow links \mid change)$ List of Uranus' moons ($\leftarrow links \mid change)$ List of Neptune's moons ($\leftarrow links \mid change)$ List of Neptune's moons ($\leftarrow links \mid change)$ List of Uranus' moons ($\leftarrow links \mid change)$ List of (mythology) (← links | change) Heinrich Wilhelm Olbers (← links | change) V-type asteroid (← links | change) HED meteorite (← links made up of the sun and all the amazing objects that travel around it. •5 min readThe universe is filled with billions of star systems. Located inside galaxies, these cosmic arrangements are made up of at least one star and all the objects that travel around it, including planets, dwarf planets, moons, asteroids, comets, and meteoroids. The star system we're most familiar with, of course, is our own. Home sweet home of its outer spiral arms, you'd find the solar system. Astronomers believe it formed about 4.5 billion years ago, when a massive interstellar cloud of gas and dust collapsed on itself, giving rise to the star that anchors our solar system—that big ball of warmth known as the sun. Along with the sun, our cosmic neighborhood includes the eight major planets. These are known as terrestrial planets, because they're solid and rocky. Beyond the orbit of Mars, you'll find the main asteroid belt, a region of space rocks left over from the formation of the planets. Next come the much bigger gas giants Jupiter and Saturn, which is known for its large ring systems made of ice, rock, or both. Farther out are the ice giants Uranus and Neptune. Beyond that, a host of smaller icy worlds congregate in an enormous stretch of space called the Kuiper Belt. Perhaps the most famous resident there is Pluto. Once considered the ninth planet, Pluto is now officially classified as a dwarf planet, along with three other Kuiper Belt objects and Ceres in the asteroid belt. More than 150 moons orbit worlds in our solar system. Known as natural satellites, they orbit planets, dwarf planets, asteroids, and other debris. Among the planets, moons are more common in the outer reaches of the solar system. Mercury and Venus are moon-free, Mars has two small moons, and Earth has just one. Meanwhile, Jupiter and Saturn have dozens, and Uranus and Neptune each have more than 10. Even though it's relatively small, Pluto has five moons, one of which is so close to Pluto in size that some astronomers argue Pluto and this moon, Charon, are a binary system. This digital collage brings together our solar system and points beyond in one view. Too small to be called planets, asteroids are rocky chunks that also orbit our sun along with the space rocks known as meteoroids. Tens of thousands of asteroids are gathered in the belt that lies between the orbits of Mars and Jupiter. Comets, on the other hand, live inside the Kuiper Belt and even farther out in our solar system in a distant region called the Heliosphere. Made of charged particles generated by the sun, the heliosphere shields planets and other objects from high-speed interstellar particles known as cosmic rays. Within the heliosphere, some of the planets are wrapped in their own bubbles—called magnetospheres—that protect them from the most harmful forms of solar radiation. Earth has a very strong magnetosphere, while Mars and Venus have none at all. Most of the major planets also have atmospheres on terrestrial Venus and Mars are mostly carbon dioxide, while the thick atmospheres of Jupiter, Saturn, Uranus, and Neptune are made primarily of hydrogen and helium. Mercury doesn't have an atmosphere at all. Instead scientists refer to its extremely thin covering of oxygen, hydrogen, sodium, helium, and potassium as an exosphere, which is made mostly of nitrogen. For centuries astronomers believed that Earth was the center of the universe, with the sun and all the other stars revolving around it. But in the 16th century, German mathematician and astronomer Nicolaus Copernicus upended that theory by providing strong evidence that Earth and the other planets travel around the sun. Today, astronomers are studying other stars in our galaxy that host planets, including some star systems like our own that have multiple planetary companions. Based on the thousands of known worlds spotted so far, scientists estimate that billions of planetary systems must exist in the Milky Way galaxy alone. So does Earth have a twin somewhere in the universe? With everadvancing telescopes, robots, and other tools, astronomers of the future are sure to find out.