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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 homelf you were to look at a giant picture of space, zoom in on the Milky Way galaxy, and then zoom in again on one 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. The closest to the sun is Mercury, followed by Venus, Earth, and Mars. 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 Oort cloud.Atmospheric conditionsThe solar system is enveloped by a huge bubble 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. Earth's is composed mainly of nitrogen and oxygen—key for sustaining life. The 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.Moons can have atmospheres, too, but Saturn's largest moon, Titan, is the only one known to have a thick atmosphere, 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 ever-advancing telescopes, robots, and other tools, astronomers of the future are sure to find out.