

Inner planets

Mercury, Venus, Earth, and Mars are the Solar System's inner planets. On the face of it, they are worlds apart—but underneath the surface, it is a different story.

The inner planets all formed from the same material about 4.6 billion years ago. All are a mix of rock and metal, with interiors that are roughly divided into layers. The heavier metals are concentrated toward the center, while the lighter rock is on top.

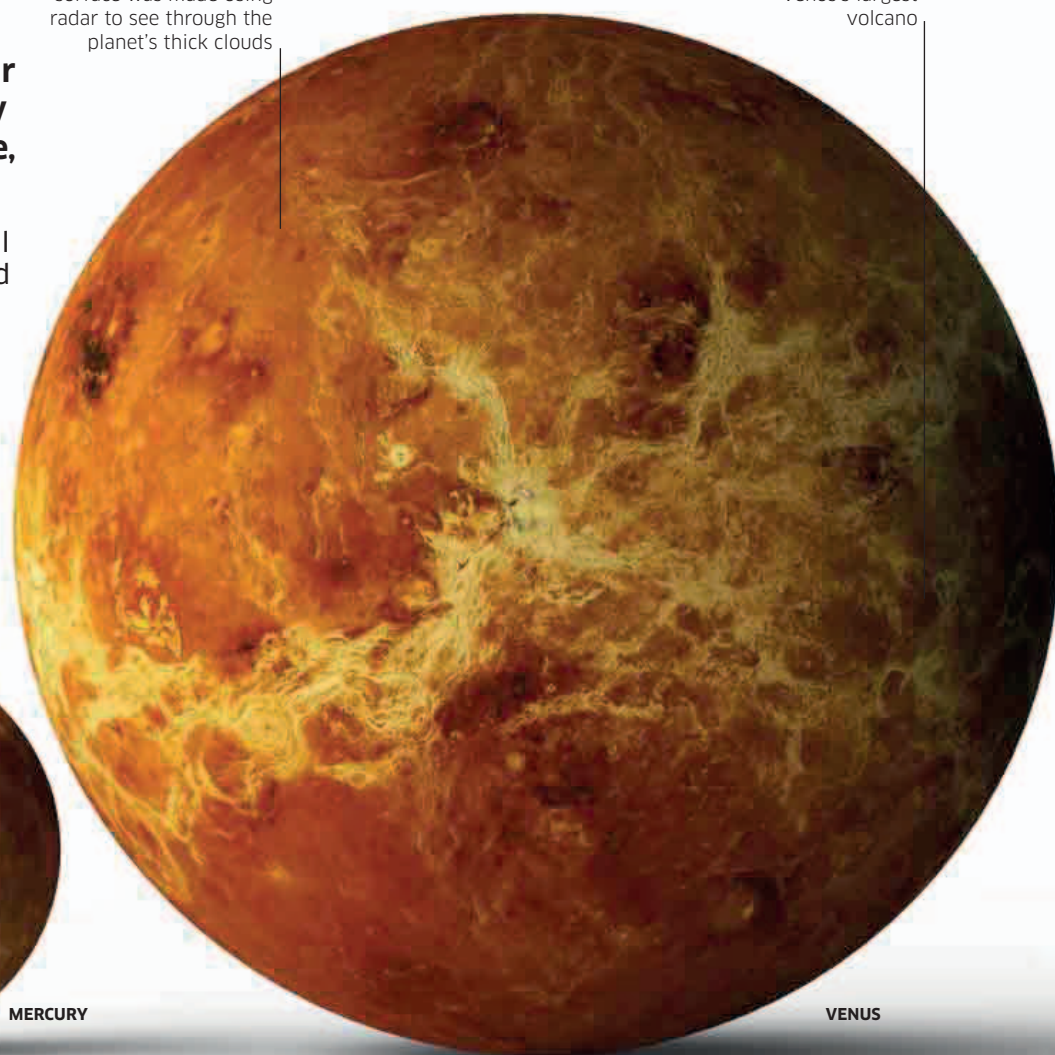
Each of these planets was bombarded by asteroids and comets early in the Solar System's history, and each has been affected by volcanic activity too. Mercury's heavily cratered face still bears the scars of the early bombardment, but the surfaces of the other three worlds have changed over time.

This view of Venus's surface was made using radar to see through the planet's thick clouds

Maat Mons is Venus's largest volcano

Smooth plains formed from lava flows in distant past

Brightest craters are the youngest



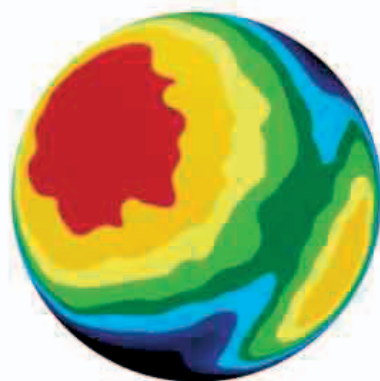
In the Sun's glare

Mercury is the smallest of the Solar System's planets and lies closest to the Sun. It is a lifeless world that has hardly changed in 3 billion years. The planet's entire surface is pitted with craters formed when asteroids crashed into it while Mercury was young. The craters range from small, bowl-shaped ones to the huge Caloris Basin, which is nearly one-third the width of the planet.

Mercury orbits the Sun more quickly than any other planet, but it rotates slowly: for every two orbits, it spins around just three times. So a "day" on Mercury (sunrise to sunrise) takes 176 Earth days. Such long days and nights, coupled with a very thin atmosphere, give Mercury the greatest surface temperature range of all the planets. In the daytime, the surface is hot enough to melt lead, but at night it's cold enough to liquefy air.

Mercury profile

Diameter 3,032 miles (4,879 km)
Average surface temperature 333°F (167°C)
One spin on axis 58.6 Earth days
One orbit of Sun 88 Earth days
Number of moons 0



Hot spots

The colors on this heat map of Mercury show the planet's surface temperature. The red region, which is on the equator, faces the Sun and is hottest. Next warmest are yellow areas, then green. The planet's polar regions (blue) are coolest.

Lava land

Venus is sometimes described as Earth's twin because it's almost the same size as our planet and has a similar internal structure. But the two worlds are very different.

Any astronaut who tried to walk on Venus would be killed in seconds. The surface is as hot as the inside of a pizza oven, and the crushing air pressure is 90 times greater than that on Earth.

Venus's deadly surface is hidden from our view by thick cloud cover, but orbiting spacecraft have used radar to see through the gloom, and landers have touched down to take photos. Venus is a world of volcanoes, many thought to be active, and its surface is littered with broken rock from solidified lava. It is permanently overcast, with a sickly yellowish light filtering through the cloud.

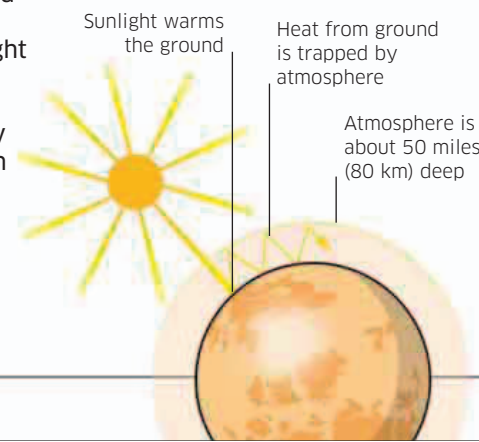
Venus spins more slowly than any other planet. It also spins in the opposite direction (clockwise) to every planet apart from Uranus.

Venus profile

Diameter ... 7,521 miles (12,104 km)
Average surface temperature 867°F (464°C)
One spin on axis 243 Earth days
One orbit of Sun ... 224.7 Earth days
Number of moons 0

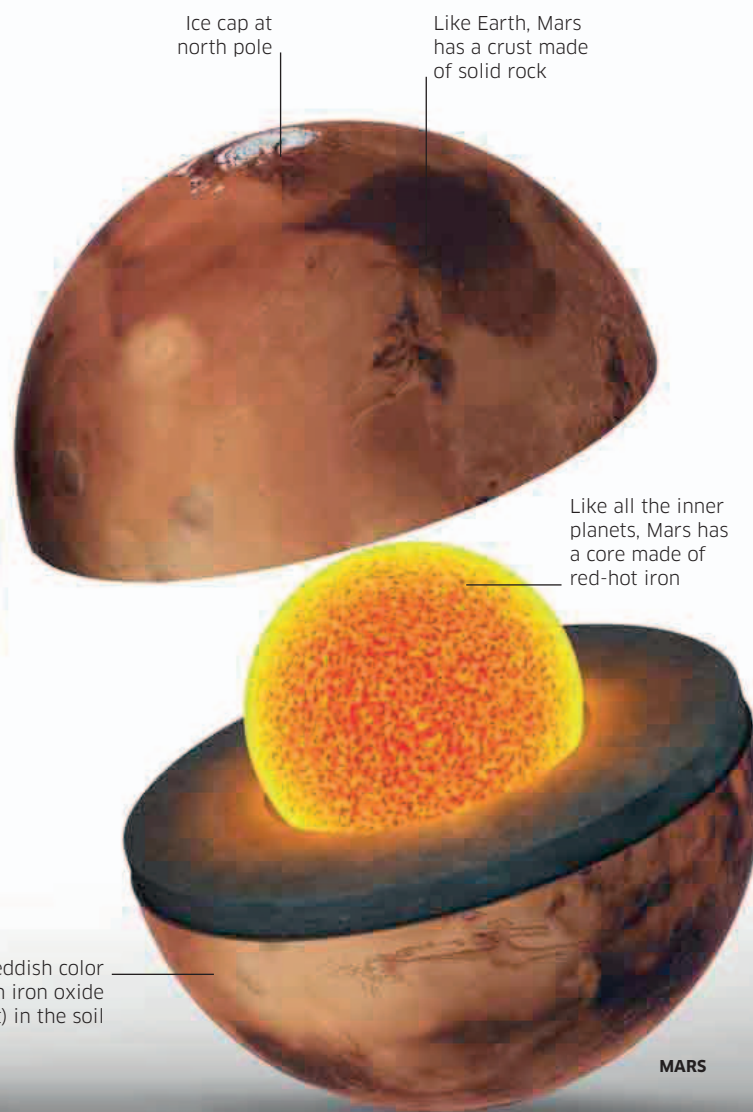
Greenhouse effect

Venus is hot because of a process called the greenhouse effect. The Sun's heat passes through the atmosphere and warms the ground, which then reemits warmth. The reemitted warmth is trapped by the atmosphere, much as glass traps heat in a greenhouse.





EARTH



MARS

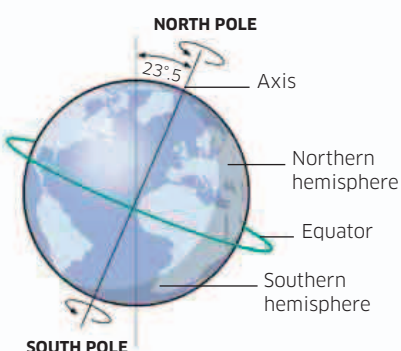
Living world

Third out from the Sun, Earth is the largest of the inner planets. It's the only planet with liquid water flowing freely on the surface, and it's the only planet in the Universe known to sustain life.

Earth's surface consists of vast oceans (71 percent), continents of land, and two polar ice caps—all supported by a thin, rocky crust. The crust is broken into seven huge segments and many smaller ones. Called tectonic plates, these giant slabs of rock creep slowly over Earth's surface, pushed by churning movements in the softer, hot rock that fills most of Earth's interior. As tectonic plates move, they bump into each other and grind past one another, generating immense forces that thrust up mountain ranges, unleash volcanic eruptions, and trigger earthquakes. These powerful forces continually change Earth's appearance, as do the actions of wind and water—and the planet's 7 billion human inhabitants.

Earth profile

Diameter...7,926 miles (12,756 km)
Average surface temperature.....59°F (15°C)
One spin on axis.....23.9 hours
One orbit of Sun.....365.3 days
Number of moons.....1



Tilted planet

Earth spins around once a day, but it isn't perfectly upright. Its axis—the imaginary line from pole to pole around which it spins—is tilted by 23.5°. So as Earth travels around the Sun, one hemisphere and then the other is tilted toward the Sun. This is what causes the seasons.

The red planet

The second smallest planet in the Solar System, Mars is half the size of Earth. It's sometimes called the red planet because of its rusty coloring. A vast canyon called Valles Marineris stretches a quarter of the way around this frozen desert world. It formed long ago when the crust of the young planet split open. Elsewhere are dusty plains strewn with boulders and giant, extinct volcanoes, including Olympus Mons—the Solar System's largest volcano.

Mars profile

Diameter....4,220 miles (6,792 km)
Average surface temperature.....-81°F (-63°C)
One spin on axis.....24.6 hours
One orbit of Sun.....687 Earth days
Number of moons.....2

Rocky floodplain

Mars hasn't always been a desert. Dry river beds show that water flowed here long ago. Floods swept rocks across the land and dumped them on floodplains like the one below. Mars may even have been warm and wet enough for life to flourish.

