



Hey, Dad, look at me!

Making

here on Earth long before the dinosaurs.

Lunar Leftovers

The planets, moons, asteroids, and comets in our solar system are actually leftovers from the formation of the sun about 4.6 billion years ago. The solar system began as a huge cloud of gas, ice, and dust. As gravity pulled everything to the center of the cloud, a slowly turning core of closely packed material formed. As it turned, the cloud began to flatten out into a disk like pizza dough flattening into a pizza as

When you think of moons, you probably picture the familiar silver-gray moon we see in our own night sky. But our solar system contains more than 165 moons, and they come in all sorts of sizes and types. Some are round, and others are irregular, oblong rocks. Thousands of craters pockmark some moons, while the surfaces of others were smoothed by ancient lava flows or frozen beneath layers of ice. A few moons even have atmospheres, active volcanoes, or vast oceans that could support life very similar to the tiny creatures that lived MoonCardsbyAmandaShepherd

Are they all made





MOONS



by Charlene Brusso

the chef
spins it in the air.

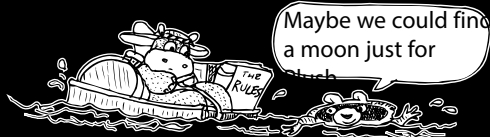
The core eventually grew dense and massive enough to form the sun. The leftover dust and ice farther out in the disk clumped together into bigger and bigger chunks to make the planets and their moons, the comets, and the

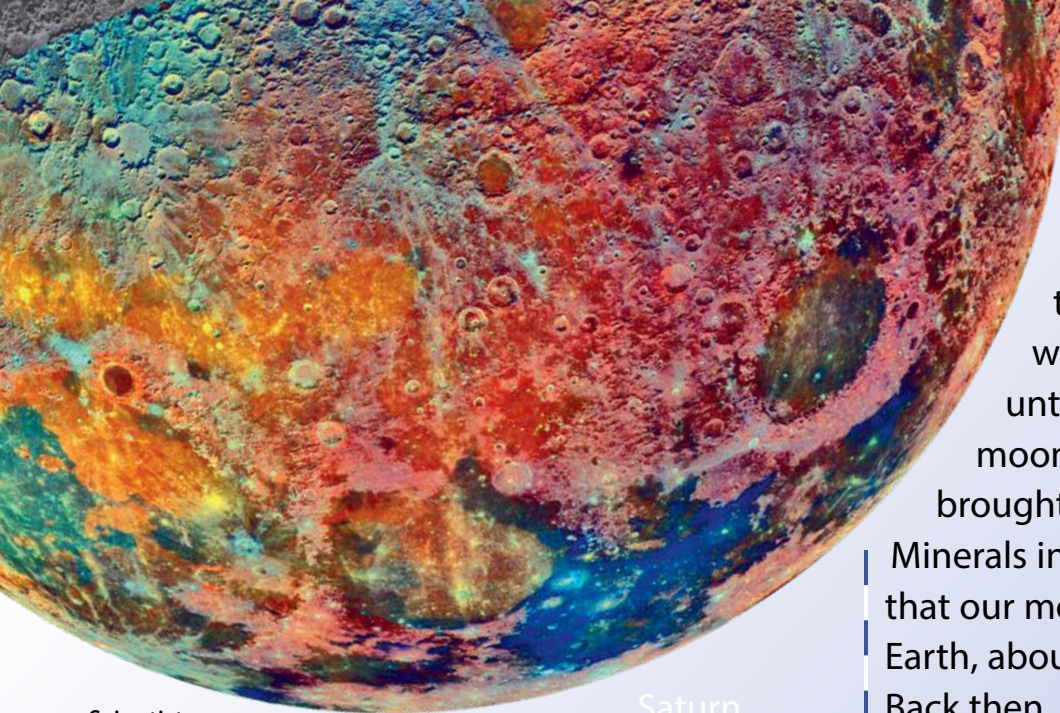
rugged rocks in the asteroid belt between Mars and Jupiter.

Beyond the asteroid belt, the rocky cores of the outer planets were massive enough to attract most of the cloud's leftover gas.

They became the "gas giant" planets: Jupiter,

Jupiter's giant red spot eyes Ganymede, the planet's largest moon. The spot is actually a huge storm high above Jupiter's surface.





Scientists color coded this picture of Earth's moon to show the different minerals it is made of. And no, the orange is not cheese,

Saturn, Uranus, and Neptune. The powerful gravity of these large planets also captured more leftover rocks than did the gravity of the smaller planets closest to the sun (Mercury, Venus, Earth, and Mars), giving the gas giants many more moons than any of the inner planets. Jupiter has at least 63 moons, Saturn at least 59. Uranus has 21 known moons, and Neptune at least 13. Of the inner planets, only Earth, with one, and Mars, with two, have moons.

All these moons are made of material from the same cloud of gas and dust—but that doesn't mean all the moons in the solar system are the same.



Chips Off the Old Block

Earth's moon got off to a smashing start, which no one suspected until scientists studied moon rocks that astronauts brought back from its surface.

Minerals in the lunar rocks show that our moon is the same age as Earth, about 4.5 billion years old. Back then, Earth was still molten—soft and hot. Scientists think an object at least half the size of Earth—perhaps another planet or large asteroid—smashed into us and knocked off an enormous glob of molten rock. The melted rock didn't have enough speed to escape Earth's gravitational pull. Instead, it cooled and hardened into the moon, forever trapped in orbit around us. The original object that struck Earth might still be inside the moon, hidden under the material it blasted off our planet.

Scientists think that two of Saturn's moons, Telesto and Calypso, may have formed from material knocked off another moon, Tethys. Telesto and Calypso are each about 20 miles across, making them two of the smallest moons in the solar system. Their lumpy shapes also



suggest that they are pieces broken off a larger object rather than moons formed from molten rock in the early solar system.

Gotcha!

Some moons may be chunks of rock and ice that got close enough to be captured by a planet's gravity. How can we tell? Moons, like ours, that formed at the same time as a planet tend to be round. They usually move in circular orbits around the planet's middle, traveling in the same direction that the planet spins. Captured moons, on the other hand,

have elliptical, or oval-shaped, orbits and tend to circle the planet at an angle above or below the planet's middle.

Scientists think Mars's rocky, oddly shaped moons, Phobos and Deimos, are captured asteroids. The outermost moons

Step aside.
Moon coming
through





How did they get



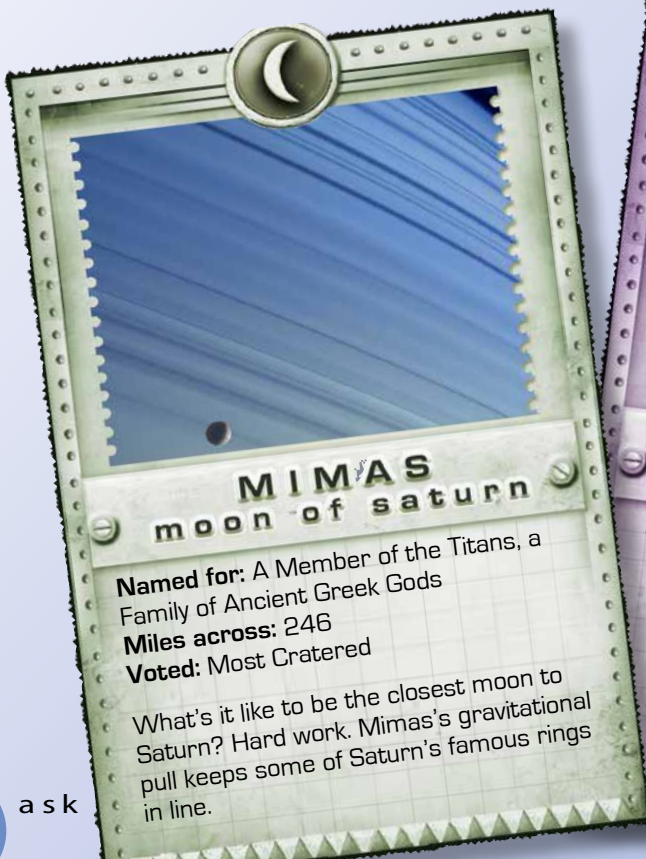
Triton is the largest of Neptune's 13 moons.

orbiting Jupiter, Saturn, Uranus, and Neptune are probably also captured moons, but they came from the Kuiper Belt, the region at the edge of the solar system. Icy rocks leftover from

the original dust cloud that formed the solar system litter the Kuiper Belt.

Kuiper Belt objects (KBOs) are some of the oldest things in the solar system. They come in all sizes and shapes, and they are made mostly of rock, minerals, and ice. KBOs interest scientists because these ancient rocks reveal what the solar system was like billions of years ago. Neptune's moon Triton and the dwarf planet Pluto and its moon Charon are the largest KBOs in the solar system.

On the Surface



MIMAS moon of saturn

Named for: A Member of the Titans, a Family of Ancient Greek Gods
Miles across: 246
Voted: Most Cratered

What's it like to be the closest moon to Saturn? Hard work. Mimas's gravitational pull keeps some of Saturn's famous rings in line.



IO moon of jupiter

Named for: A Greek River Fairy
Miles across: 2,230
Voted: Most Volcanic

This moon's got it all! Lava! Gas! Huge tides! Bubbling and boiling Io has the most volcanoes in the solar system. Its surface bulges in and out as Jupiter's gravity tugs on it.

A moon's surface tells a lot about its past. Craters and large flat areas of dark rock called maria (Latin for "oceans") cover our moon. The craters on the moon are very old. They tell us that when the planets and moons were forming and cooling, lots of loose debris was zipping around the solar system. Most moons are covered with craters where these young space rocks crashed into them.

The dark, flat areas on our moon show that long ago it bubbled with volcanoes. Molten rock erupted from the inside and spread across the surface, filling in some of the craters. The volcanic

rock cooled into the smooth plains we call maria.

Mimas, one of Saturn's moons, is covered with many tiny craters and one gigantic one named after astronomer William Herschel. Enormous cracks spread across the surface on the side of the moon opposite Herschel (the crater, not the astronomer). Scientists think that some large object smacked into Mimas early in its history. The impact created the giant crater and caused the large cracks—stress fractures—on the opposite side. If the object that hit Mimas had been any larger, it might have shattered the moon into rubble.

My moon shines by reflected



Living Moons

