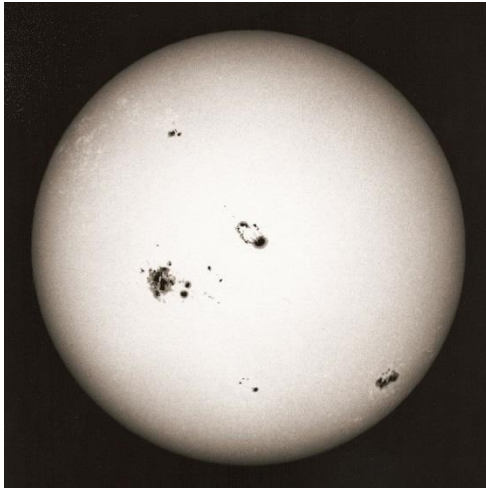


## Profiles of the Sun and the Moon

by Andrew Fraknoi and Dennis Schatz

As we saw in *When the Sun Goes Dark*, the two main “characters” involved in an eclipse are the Sun and the Moon. We thought you might enjoy learning a little more about these two important objects in the sky.

### The Sun



This image of the Sun was taken by Hans Bernard with a small telescope and a special filter to cut down the strong light of the Sun. You can see several groups of sunspots on the picture. These are cooler, darker areas on the Sun’s surface that don’t give off as much light as the rest of the Sun. *Source:* Wikipedia Commons [https://upload.wikimedia.org/wikipedia/commons/1/10/Sun\\_with\\_sunspots.JPG](https://upload.wikimedia.org/wikipedia/commons/1/10/Sun_with_sunspots.JPG).

The Sun is our star—a giant ball of super-hot gas, shining under its own power. Just how big is the Sun? It measures 1,440,000 km (864,000 miles) across. That means more than 100 Earths could fit into a line drawn across the middle of the Sun. It would take more than 1 million Earths to fill up the volume of the Sun. And the Sun is so hot on its surface (9,900°F) that both you and your spaceship would just boil away (*evaporate*) if you went there.

Like all stars, the Sun is shining, producing vast amounts of light. The Sun is much brighter in our sky than are other stars because it is much closer to us. The distance between Earth and the Sun is 1,550,000 km (93 million miles), which is pretty far compared to how far you can hike. But compared to how far away the other stars are, our Sun is really just “next door” to us.

Just a small fraction of the light the Sun makes reaches Earth. Yet, it is enough to supply all the light and heat we need to live comfortably on our planet. And the good

news is that the Sun is going to continue making light for billions of years longer. It's already been at it for almost 5 billion years, and its storehouse of fuel is still well stocked.

So it's up to us humans to keep Earth a nice place to live. The Sun is going to do its part, if we do ours.

## The Moon



This picture of the full moon was taken by NASA's Galileo spacecraft in December 1992. You can see the dark, round areas on the Moon that astronomers call Maria. They are deep craters made by large rocks that hit the Moon and exploded. Dark lava from under the Moon's surface then flooded into the round craters, which makes them look darker and smoother. The white crater near the bottom of the picture is called Tycho (after the great 16th-century astronomer Tycho Brahe). *Source: Wikipedia Commons [https://upload.wikimedia.org/wikipedia/commons/b/b3/Full\\_moon.jpeg](https://upload.wikimedia.org/wikipedia/commons/b/b3/Full_moon.jpeg).*

A moon is a smaller world that goes around a planet. Some planets, such as Jupiter, have more than 60 moons, but our planet Earth only has one. Other moons have names, but we just call Earth's moon "The Moon" (with a capital M to show that it's important).

The Moon is a pretty big world for a moon, about 3,500 km (2,100 miles) across. It is one-fourth the diameter of Earth. It takes about 27 days for the Moon to go around Earth, and it also takes 27 days for it to rotate (spin around) once. The fact that the Moon takes exactly the same time to go around Earth as to spin around leads to an interesting result.

Think of it this way. When the Moon is one-quarter of the way around Earth, it's also made one-quarter of a turn. When it's halfway around Earth, it made one-half a

rotation. Try this yourself by going around some fixed object in your house, such as a small table. Start by facing the table. What do you notice?

For the Moon, the result is that one side of the Moon is always turned toward Earth. The other side is always pointing away from Earth, and we can't see it. That's why people talk about the *near side* of the Moon, which you can see any time the Moon is in the sky, and the *far side* of the Moon, which we can only see when we send spacecraft around the Moon to take pictures of it.

There is no air on the Moon, which means there is no weather there, either. Without air, there can't be liquid water on the Moon.

The Moon is covered by *craters*, round hollowed-out areas. These form when a rock from space hits the Moon and explodes, carving out a round pit. The material missing from the crater is piled up around it in a ring of mountains.

Without weather or water, these craters are not disturbed or erased on the Moon. So we can see craters made billions of years ago, as well as craters that were made much more recently. The Moon has a nice record on it of the times it has been hit over its long history. We use that record to study how often the planets must have been hit, too.

The Moon is the only object in the sky that people have visited. From 1969 to 1972, 12 human beings landed on the Moon as part of NASA's Apollo program. They explored the areas where they landed and brought back 840 pounds of moon rocks. It's nice to have chunks of another world that scientists on Earth can study.