

Explore the Moon

Understanding the moons size relative to the Earth.

Consider the Museum of the Moon's 7m sphere. If this was the real moon it would weigh near 600 tonnes (593,000kg)!

The Earth would be a massive blue / green orb with an impressive diameter of 25.7m, weighing 49,000 tonnes. And, to ensure the astronomical scale is correct, the distance between the two would be about half a mile (770m).

How did the moon form?

The current leading hypothesis for how the moon formed is that it was the result of a collision between the Earth and a planet-sized rock approximately 4.5 billion years ago. This was during the formation of the Earth and solar system. When this object, about the size of Mars, smashed into the early Earth and sprayed molten rock into orbit around the battered planet.

Over millions of years, due to the gradual pull of gravity, these orbiting fragments slowly came together, coalescing to form the moon.

Why does the moon have so many craters?

Many of the moon's craters are thought to have been created billions of years ago during a period known as the late heavy bombardment. Both the Earth and the Moon would have experienced thousands and thousands of large asteroid impacts during this period, however much of the evidence of this on Earth has been erased by active plate tectonics and erosion driven by weather. The moon on the other hand, with no atmosphere and little if any plate tectonics, has remained relatively unchanged and still shows evidence of this violent period.

Some of these ancient impact craters are visible to the naked eye as the dark patches that cover the face of the moon. These dark patches are named 'maria' (the Latin word for sea) and are thought to have been formed by volcanism shortly after the formation of the moon and a number of very large asteroid impacts.

Why do we only ever see one side of the moon?

We only ever see one side of the moon from Earth. This phenomenon is called tidal locking and is actually fairly common throughout the solar system. It occurs when an object, such as the moon, takes the same amount of time to rotate once on its axis as it takes to complete an orbit. Tidal locking between two objects occurs over millions of years and is driven by subtle gravitational interactions known as tidal forces. Amazingly this tidal locking is also causing the moon to slowly move further away from us and causing the Earth's rotation to slow down. Over millions of years, our 24 hour day length will get longer.

What is the dark side of the moon

The dark side of the moon is the name given to the far side of the moon, not visible from Earth. Funnily enough, the dark side of the moon isn't always dark- in fact, it sees just as much sunlight as the side of the moon we do see. In addition, due to the influence of the Earth on the moon after its formation, there are far fewer dark patches (mare) on the far side of the moon.

Where were the Apollo landings and why can't we see them?

In total there were six missions that landed astronauts on the surface of the moon. Each of these missions landed in different locations, although all are on the side of the moon facing us. The most iconic of these, completed in 1969 by Buzz Aldrin, Neil Armstrong and Michael Collins, landed on the edge of the Sea of Tranquility.

None of the Lunar landings are visible to the naked eye, or by telescope for that matter, due to the great distance between the Earth and moon (averaging 384,400km). The smallest features we can observe on the moon with the naked eye are generally greater than 300km across. A great example of a small but still visible object on the moon is the brilliant crater Tycho on the south of the moon.

Phases of the moon and eclipses

The moon's phases, which occur over a 28 day period, are caused as it orbits around the Earth. The part of the moon visible to us is illuminated by the sun, or in daylight. At certain places in the moon's orbit, it lies between the Earth and sun and we're only able to see a thin crescent of this daylight- most of the moon is cast in shadow. When the Earth is between the moon and the sun we're able to see the majority of the daylight side and we call this a full moon.

The changing phases of the moon every 28 days show us its orbit around the Earth. The visible part of the moon is in daylight, illuminated by the sun. The curved shadow cast across the moon's face gradually moves as the moon's position in space relative to the Earth and the Sun changes.

In its crescent phase, especially near a new moon, the area of moon cast in shadow can be seen faintly illuminated. This faint glow is produced by Earthshine, light reflected off the surface of the Earth back onto the moon. A crescent moon will always be in the sky close to the Sun so they are often easy to miss. Look directly after sunset or just before sunrise and see if you can see the night time side of the moon illuminated by the Earthshine.

A few times per year, the moon passes directly in front of the sun casting a shadow down on Earth, producing a Solar Eclipse. This is an amazing cosmological coincidence. The disc of the Sun is 400 times larger than the moon, but is also 400 times further away. In the future, as the moon moves further from us, the disc of the moon will not exactly cover the disc of the Sun and this amazing phenomenon will be lost.

Even more frequent are lunar eclipses, where the Earth's shadow falls on the face of the full moon turning it a deep red colour. Under the right conditions during a lunar eclipse it is even possible to see the curvature of the Earth as its shadow passes across the moon.