The Lunar Disc

An overview of the moon, as well as its features, evolution, origin & orbit

Abstract

The Moon is something that we all see every day. It is well-known throughout science fiction and popular media, as well as being the subject of many a household tale. As such, a lot is known about it.

However, there is still a lot that many people don't know about the Moon, such as facts regarding its features, its interesting **synchronous rotation** to do with its orbit of the Earth, and of multiple theories attempting to explain its formation and gradual evolution.

Objectives

- Being able to accurately differentiate from maria, terrae & craters by looking at the moon through the naked eye
- Being able to explain why only one side of the Moon is ever visible, and small parts of the Northern, Southern, Eastern & Western edges are visible at times
- Being able to theorise as to its origin
- Being able to explain its evolution in terms of basins

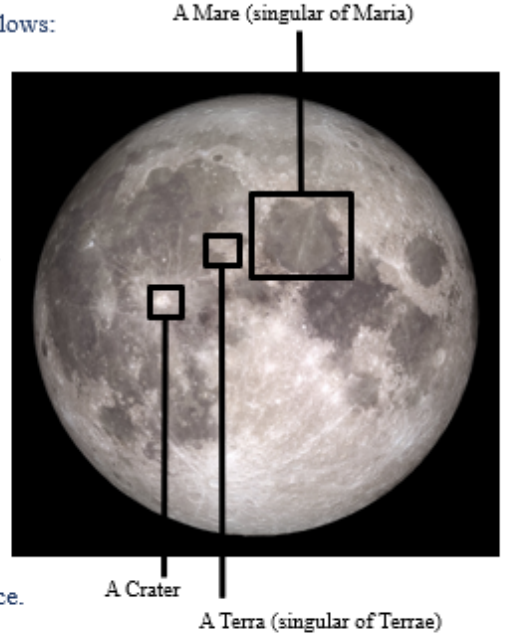
Sampanna Raut, King Edward VI

Camp Hill School for Boys

Features of the Moon

The key features of the Moon, visible to the naked eye, are as follows:

- Maria
- Terrae/Mountain Ranges
- Craters



Maria

These are flat, dark areas of volcanic basaltic rock, easily visible. They were originally mistaken for seas, but were later corrected to be made of volcanic material (see evolution section).

Terrae

These are raised, mountainous highlands of igneous rock that cover the surface. They are visible as speckled, almost rough patches on the moon of rocky land.

Craters

These are large cavities of compressed surface area, also easily visible. They were formed by meteoroids striking the lunar surface.

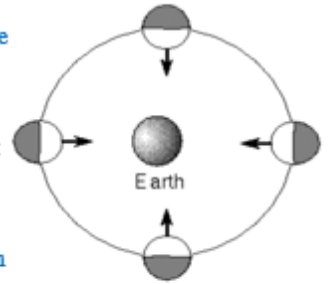
The Moon's orbit of the Earth

Our Moon, like many other moons, exhibits a phenomenon known as **synchronous rotation**. This is where the Moon completes a full orbit of the Earth every 27.32 days, whilst also rotating about its axis once every 27.32 days. This synchronous orbit means that we can only see the 'near side' of the Moon from a naked eye.

However, what makes the Moon's orbit interesting is that we can only see half of the Moon as per the model on the right, but we can actually see 59% of the Moon's surface! This is due to **lunar libration**, and means that we can effectively see around the Northern, Southern, Eastern & Western limbs of the Moon.

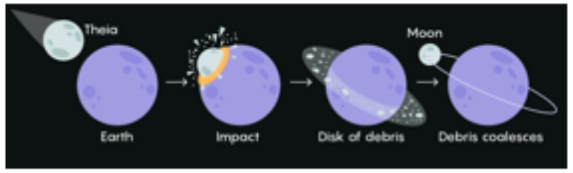
This libration is partially due to the Moon occasionally 'wobbling' out of its position, but mostly due to its orbit. The Moon's rotational axis is tilted at 1.5° to the ecliptic and its orbit is tilted at 5.14° to the ecliptic. These combine to make it appear very high in the sky, to allow one to look 'under' or 'over' the moon depending on where one is.

An important thing to note about the Moon's orbit is that while it is elliptical, the Moon's orbital speed varies, and one can see areas that they wouldn't normally. Thus, an observer on Earth can just about make out the details of the Moon around its Eastern & Western edges.



The origin of the Moon

There is a leading theory for the formation of the Moon: the **Giant Impact Hypothesis**. It states that a large body called Theia made a glancing blow with the young Earth, throwing up debris from both objects which cooled to form the Moon. Evidence supporting this is that there are no volatiles on the Moon, and that it has a small iron core, like Earth.



Other theories include:

- Capture – the Moon & Earth formed separately, and the Moon was captured by Earth's gravity
- Co-Accretion – the Moon & Earth formed together simultaneously
- Fission – the Earth spun so rapidly that part of it broke off to form the Moon

The evolution of the Moon

Early in its history, the Moon was bombarded with asteroids & meteoroids, forming basins. Then, around 400 million years ago, molten lava seeped through the crust, before solidifying to form maria and pushing up to form terrae. This along with crater impacts, helped to shape the Moon to what we se it to be today.

Acknowledgements & Conclusion

In conclusion, it is fair to say that the Moon is far more expansive than previously imagined, and that there is still a lot to learn.

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