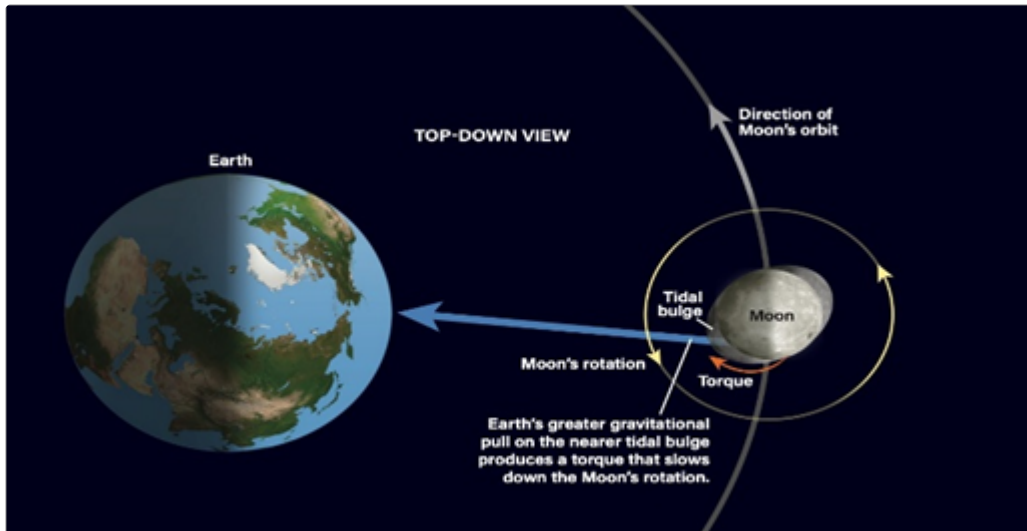




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Tidal Locking Explains Why Only One Side of the Moon is Visible from Earth

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NASA explained the concept of tidal locking, which is the reason why the same side of the Moon is always visible from Earth.

The Moon is tidally locked with Earth, meaning:

It takes the same time to rotate on its axis as it does to orbit Earth.

As a result, only one hemisphere (near side) of the Moon is visible from Earth.

The far side remained unknown until 1959 (Luna 3 mission).

Tidal locking occurs due to gravitational interaction between two bodies over long periods.

What is Tidal Locking?

A phenomenon where:

Orbital period = Rotational period of a celestial body.

Also known as:

Synchronous rotation

Spin-orbit locking

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Example:

Moon–Earth system

How Does Tidal Locking Occur?

Due to tidal forces (gravitational pull differences) acting on a body.

These forces create tidal bulges, causing:

Internal friction

Gradual slowing of rotation

Over millions of years, rotation synchronizes with orbit ? tidal lock achieved.

Important Facts About the Moon

Rotation period ? 27.3 days

Orbital period ? 27.3 days

About 59% of the Moon's surface is visible from Earth due to libration.

Occurrence in the Solar System

Most large moons are tidally locked with their planets.

Examples:

Moons of Jupiter and Saturn

Special case:

Pluto–Charon system (mutually tidally locked)

Significance

Explains:

Why we always see the same face of the Moon

Helps in:

Understanding orbital mechanics and planetary evolution

Important for:

Study of exoplanets (many may be tidally locked)

Related Concepts

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Tidal Forces ? Cause ocean tides on Earth

Tidal Heating ? Internal heating due to friction

Tidal Acceleration ? Gradual change in orbit and rotation

Future Scenario

Earth may also become tidally locked with the Moon after billions of years (theoretical).