

- Given sufficient time, the Earth's rotation period would slow down until it equals the Moon's orbital period - so that the same face of the Earth would face the Moon at all times. We call this synchronous rotation

(This will happen when the Earth's "day" is 47 days long)

In the case of the Moon, synchronous rotation has *already happened !!!*

- Tidal locking has occurred much more rapidly for the Moon than for the Earth because the Moon is much smaller, and the Earth produces larger tidal deformations on the Moon than vice versa.
- The Moon is not exactly 'tidally locked': over about 30 years, 59% of its surface is visible from the Earth. This is because of a wobble known as *Libration* - which is caused by the gravitational perturbations of the Sun (and other planets) on the Earth-Moon system, and the fact that the Moon's orbit is slightly eccentric.
- Many of the satellites in Solar System are in synchronous rotation, e.g.:-

Mars: Phobos and Deimos

Jupiter: Galilean moons + Amalthea

Saturn: All major moons, except Phoebe + Hyperion

Neptune: Triton

Pluto: Charon

- Pluto and Charon are in mutual synchronous rotation: i.e. the same face of Charon is always turned towards the same face of Pluto
- Triton is in synchronous rotation, but is orbiting Neptune on a *retrograde* orbit (i.e. in the opposite direction to Neptune's rotation).