

**EARTH AND MOON:
DAY AND NIGHT; ROTATION AND REVOLUTION**
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As a demonstration and in the following diagrams, we attempt to explain the difference between a “day” on the Earth (or Moon) and the time it takes for the Earth to rotate on its axis. This will also demonstrate the difference between the time it takes for the Moon to revolve around the Earth (also its rate of rotation) and the time it takes the Moon to cycle through its phases (the length of a “day” on the Moon).

You may hear the terms sidereal (relative to the stars) and synodic (relative to the Sun). The sidereal day is the length of time it takes an object to rotate once on its axis. For the Earth, this is 23hr 56min 4.09054sec. However, at the same time that the Earth is rotating on its axis, it is also revolving around the Sun. Assume that the Sun is overhead. In the time that it takes the Earth to rotate once on its axis, it has moved 1/365 of the way around its orbit. Therefore, for the Sun to be overhead again, it has to rotate another degree. This takes nearly 4 minutes, the difference between the sidereal day and the synodic day!

The same is true for the Moon. As we demonstrate in front of the group, since we always see one side of the Moon, this implies that the Moon rotates once on its axis in the same amount of time that it takes to revolve once around the Earth (27.322 days). However, at the same time, the Earth-Moon system has revolved nearly 29 degrees in its orbit around the Sun. Thus, the Moon must rotate/revolve another 29 degrees (2.21 days) for a place on the Moon to go from noon to noon, a lunar day, 29.531 days. This is also the lunar cycle, full Moon to full Moon (noon to noon for the sub-Earth point).



