

Phases and Eclipses
Lecture outline -- 1

Reading: *Astronomy Notes* section 3.7

Vocabulary terms used:

sidereal period—the period of revolution of one object around another measured with respect to the stars (e.g., for the Moon, it is 27.3 days).

synodic period—the time required for a planet or moon to go from a particular configuration with respect to *the Sun* back to that same configuration (e.g., for the Moon, it is the time to go from a given phase back to the same phase—29.5 days).

solar eclipse—when the Moon covers up part of or all of the Sun at exactly new phase; the Moon’s umbra and/or penumbra reaches the Earth.

lunar eclipse—when the Earth’s umbra and/or penumbra strikes the Moon at exactly full phase.

umbra—region of total shadow; the light source is totally blocked.

penumbra—region of partial shadow that is outside of the umbra; the light source is partially blocked.

refraction—the bending of waves when they pass from one transparent medium (or vacuum) to another (e.g., sunlight bending as it passes through the Earth’s atmosphere).

Outline

Motions of the Moon

Moon’s *rotation* :

Phases (see table section 3.7.1 of *Astronomy Notes*)

Cause of the phases of the Moon [demo in class]

Phase	Position vs. Sun	Time behind/ahead of Sun	Moon rises (eastern sky)	Moon crosses meridian (southern sky)	Moon sets (western sky)
New Moon	< 5°	Within few minutes	Sunrise	Noon	Sunset
First Quarter					
Full Phase					
Third Quarter					

Each major phase is _____ apart

Why popular Earth shadow model is wrong _____

Phases and Eclipses
Lecture outline -- 2

Eclipses

Why eclipses are rare _____
(another reason why Earth shadow model for phases is wrong)

Why eclipses do not happen at the same time every year _____

Lunar eclipse

Phase _____

Why the Moon still has some sunlight reaching it _____

Why the Moon gets redder _____

Solar eclipse

Phase _____

Total vs. annular solar eclipse