

Lecture 6

Learning Goals:

By the end of class today you should be able to ...

- Explain how the length of the day can be measured.

Reading for Today: Unit 7

Reading for Wednesday: Units 8.1

Measuring the Length of a Day

- 2 different definitions
 - Measure with respect to the Sun
 - **Solar Day**
 - Measure with respect to the Stars
 - **Sidereal Day**

The Day

- Solar Day: time interval from when Sun is on the meridian to when it returns to the meridian.
 - Problem: this isn't quite constant
- Sidereal Day: length of day measured with respect to the stars. The length of time it takes a star to return to our meridian.

Sidereal Day

- Length of sidereal day is 23 hours, 56 minutes, 4 seconds
- Solar day is 24 hours long
- Why is it shorter than a solar day?
 - Since Earth has moved a bit in its orbit, the Earth has to rotate a bit more for the Sun to be back overhead again.

Analemma

- Image of Sun taken at the same time of day throughout a year from the same location.

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Lunation

- Lunar month is
~ 29.5 days
- one lunar orbit around the Earth
- As more becomes illuminated – **Is the moon waxing or waning?**
- As less becomes illuminated – **Is the moon waxing or waning?**

Why Do We See the Moon Go Through Phases?

- As it orbits the Earth, the Moon's position relative to the Sun changes.
→ Fraction of surface we see illuminated changes over the course of the month

How much of the total surface of the moon is always illuminated by the Sun?

Lunar Phases (description refers to visible surface)

- New – completely dark
- Waxing Crescent – Less than half illuminated, but increasing
- First Quarter – Right half is illuminated
- Waxing Gibbous – More than half illuminated and increasing
- Full – completely illuminated
- Waning Gibbous – More than half illuminated, but decreasing
- Third Quarter – Left half is illuminated
- Waning Crescent – Less than half illuminated and decreasing.