

Motions of Non-stars

9-7-2005

Opening Discussion

- Have you seen anything in the news? What did we talk about last class?
- Some of you might not have noticed, but the appendices of your text include a math refresher (including scientific notation). Math doesn't get much harder than what we have done.
- Those of you who are reading also notice that the class is not moving as fast as the reading. I'm not saying everything that is in the reading in class. The plan is to expound on parts of the reading in greater depth and hit significant topics more. Tests and quizzes can hit all of the above.
- Printing slides more than 1 per page.

The Moon

- After the Sun, the most prominent object we see in the sky is the Moon. As seen from the Earth, the Sun and Moon have about the same angular size, both are roughly 0.5 degrees across.
- Because the Moon only reflects sunlight, we see it in different phases depending on where it is relative to the Earth and the Sun.
- You have also likely noticed that we always see roughly the same side of the Moon. We'll talk later about tidal locking which is why that is the case.

Phases

- The Moon orbits the Earth (relative to the Sun) every 29.5 days. During each lunar month we see the Moon in all of its phases.
- The Moon orbits the Earth in the same direction that the Earth rotates and orbits the Sun.
- Knowing these things, can can figure out where in the sky the Moon should be when it is in different phases and where it is headed.

Eclipses

- An eclipse occurs when one body casts a shadow on another. The ones that are most impressive to view on the Earth are solar and lunar eclipses. These occur when the Earth moves through the shadow of the Moon or the Moon moves through the shadow of the Earth respectively.
- These have to happen at full or new moons, but because the Moon's orbit is inclined 5 degrees to the ecliptic, they don't happen at every new moon or full moon. A lunar or solar eclipse can only occur when the “nodes” of the Moon's orbit are lined up with the Earth and Sun and the Moon is at the right phase.

Planets (Wanderers)

- You can easily see the 5 closest planet without the aid of telescope or binoculars. Venus and Jupiter are easy to see as they are brighter than any stars. Mars looks similar to a bright red star. Saturn can easily be confused to a moderately bright star.
- The planets move through the zodiac, close to the ecliptic. Their motion is more complex than that of the Moon or Sun because there are two orbital motions involved. This leads to occasional “apparent retrograde” motion where a planet appears to move backwards through the field of stars.

Stellar Parallax

- Your book gives a fair discussion of the history of the idea that the Earth was not the center of the Universe. One of the primary arguments against it was that naked eye observers couldn't see stellar parallax. As we move around the Sun, one expects that closer stars should appear to move relative to the more distant ones.
- Stellar parallax is observable with a telescope. The apparent motion of the star as the Earth moves from one side of the Sun to the other is very small though. At a distance of one parsec (3.26 ly) a star would have a parallax motion of 1 arcsecond.

Minute Essay

- Venus never does rise at sunset. Why is that? To figure this out, think of the geometry of what that means.
- Assignment #1 is due at the beginning of next class.