Summary of Lecture 2

Key points include:

1. Astronomy has a large range of numbers and therefore we need to learn how to write and scientific notation. For example, 299,792,458 m s^{-1} (the speed of light in a vacuum) can be written as 2.99792548×10^8 m s^{-1}.
2. Units are important! If you need something with units of mass and you get something with units of meters, something has gone wrong. **You need to indicate the units of every answer you give**.
3. A light year is **distance**, not time. It is the distance that light in a vacuum travels in one year, and is about 10 trillion (10^{13}) kilometers.
4. The (simplified) scientific method is to observe, form hypotheses, test predictions made with those hypotheses, and repeat; if your predictions are wrong then the hypothesis is disproven.
5. In the less simplified scientific method, hypothesis can come from other sources (dreams!), hypotheses are tested in bundles (e.g., when you measure something you assume knowledge of the measuring device), and we have to take into account consistency with previous knowledge and not just the measurement at hand. But fundamentally, nature (via observation and measurement) has the last word, rather than aesthetics or personal preferences. Hypotheses can be *rejected*, but never *proven*. Also, when possible, simple hypotheses are better than complicated hypotheses.
6. No experiment or measurement is perfect. It is extremely important to *quantify* measurement uncertainty and take it into account, statistically.
7. The "celestial sphere" is an imaginary sphere on which everything in the sky beyond Earth (e.g., the Moon, Sun, planets, stars, galaxies, ...) is projected. We can measure angles between any two things on the celestial sphere.
8. If we have an object of diameter D that is a distance L from us, and $L \gg D$, then the *angular size* of the object (sometimes called the apparent size) is very close to D/L *measured in radians*. A radian is $\frac{1}{2\pi}$ of the full 360 degrees of a circle.
9. Officially, the celestial sphere is partitioned into 88 regions called "constellations"; colloquially, constellations are patterns of stars that we see in the sky **but** the stars can actually be at much different distances from us.
10. The Milky Way is a band of light composed of stars in the plane of our galaxy (or Galaxy, as the cool astronomers call it!).