LENGTH UNITS ASTRONOMY 107, DR. WILLIGER

Astronomy uses many units, due to the huge range in size, mass etc. of objects in the Universe. Fortunately, the metric system gives us a handy system of prefixes so we can convert easily between units. We try to use units within 2 orders of magnitude (a factor of 100) of 1: 0.01 to 100. If we have to use units which are smaller than 0.001 or greater than 1000, it's better to use the next unit down or up.

Angstroms (Å) are a red herring in astronomy, but they're very well-established so it's worth being familiar with them. 1 Å is 10^{-10}m. We will try to use nm instead of Å as much as possible, but it's hard to cut out all references to Å in the course.

A micron (μm) is 10^{-6}m. We don't say micrometer because that's an instrument to measure small distances. We can't use mm for the symbol because that's used for millimeters.

We use centimeters (cm), but hope that it's easy to remember that 100 cm = 1 m, or 10 mm = 1 cm. Most often, they're used for radio wavelengths.

At the moment, we don't usually use megameters or gigameters in astronomy. We rather use 1000 km and 1,000,000 km. After that, we start to use units like Astronomical Units, parsecs, kiloparsecs, megaparsecs etc. (A parsec is 3.26 light years.) There are conversions in the back of the textbook for those.

In the table below, small units are on the left and at the top. Large units are at the right and on the bottom. The way to read the table is "unit on the left times the factor in the column = unit on the top".

You are expected to know the units and symbols in this table, and how to convert from one to the other.

unit	Å	nm	μm	mm	m	km
Å	1	10	10^4	10^7	10^{10}	10^{13}
nm	0.1	1	10^3	10^6	10^9	10^{12}
μm	10^{-4}	10^{-3}	1	10^3	10^6	10^9
mm	10^{-7}	10^{-6}	10^{-3}	1	10^3	10^6
m	10^{-10}	10^{-9}	10^{-6}	10^{-3}	1	10^3
km	10^{-13}	10^{-12}	10^{-9}	10^{-6}	10^{-3}	1