SUMMARY OF COLOR TEMPERATURES

In physics, there is a theoretical object called a black body. When a black body has a temperature above absolute zero, it radiates electromagnetic radiation. At certain temperatures, the majority of this radiation falls inside the visible spectrum - what we think of as light.

The intensity of this radiation, plotted against frequency, gives a bell-shaped curve. The position of this bell in the spectrum is dependant on the temperature of the black body.

We can use the same principle in reverse to describe some light we see by the temperature of the black body that would produce the same light.

For instance, the Sun is very close to being a perfect black body, and has a surface temperature of 5500K (degrees Kelvin, or temperature above absolute zero). The radiation from the Sun is mostly within the visible spectrum (unsurprisingly, as our eyes have evolved to make best use of it). The light from the sun is considered to have a colour temperature of 5500K, as this is the temperature that at which a black body would emit this light.

So, when we say that a lamp has a colour temperature of 3200K, what we mean is that if a black body were heated to 3200K, it would give off the same light.

Of course, this is only totally valid if the light source in question behaves as a black body. The Sun does (to any useful accuracy), and so do most objects which simply give off light because they are hot (for instance, the filament of an incandescent lamp). In fact, an incandescent lamp with a colour temperature of 3200K will have the filament at a temperature very close to 3200K.

It is not strictly valid for discharge lamps, as they do not have continuous spectra. To take an extreme example, a low pressure sodium lamp (as in old streetlights) emits at only two distinct wavelengths, so that rather than the bell-shaped curve mentioned above we would see two spikes. A colour temperature cannot be given for this lamp, as a black body would never give this light at any temperature.

Discharge lamps used in theatre are, of course, designed to give close to a continuous spectrum in order to give good colour rendition, and so they can come fairly close to a black body's bell-shaped curve. Thus some mathematical trickery (I don't know what) is used to give a figure for their colour temperature.

Hope this makes sense. Feel free to ask for clarification...