Apparent magnitudes

DF

Stars were first classified by their brightness around two thousand years ago (by the Greek astronomer, Hipparchus). The brightest stars were assigned a magnitude one, whilst the faintest stars visible to the naked-eye had a magnitude of six. Intermediate values can also be assigned to stars, the brightnesses of which are in between.

This is an extremely awkward scale, but it remains in general use. Since the scale is concerned with comparing how bright different stars appear to be, these magnitudes are called apparent magnitudes.

Magnitude one stars are now defined to be one hundred times brighter than magnitude six stars. So, how does a difference of one magnitude affect the light intensity?

1 2 3 4 5 6

From magnitude six to magnitude one is a change of five magnitudes, corresponding to a factor of one hundred in brightness.

So, if a factor of x gives a change of one magnitude, it follows that $x \times x \times x \times x \times x = x^5$, gives a change of five magnitudes, we can write:

$$x^5 = 100$$

Hence,

$$x = 100^{\frac{1}{5}}$$

So,

$$\underline{x = 2 \cdot 512} \quad \left[\text{Check: } 2 \cdot 512^5 = 100\right]$$