ASTR 130 Formulas & Constants

k = kilo = 10^3 — $c = 3 \times 10^8$ m/s — 1 ly = 9.5×10^{12} km

M = mega = 10^6 — $h = 6.63 \times 10^{-34}$ Js or — 1 AU = 1.5×10^7 km

n = nano = 10^{-9} — $h = 4.15 \times 10^{-15}$ eVs

m = milli = 10^{-3} — $\sigma = 5.65 \times 10^{-34}$ W/m^2/K^4

Review from A129:

$\alpha = \frac{s}{d}57.3°$	$p^2 = a^3$	$v = \frac{\Delta x}{\Delta t}$	$a = \frac{\Delta v}{\Delta t}$	$net\, F = ma$	$p = mv$	$L = mvr$	$KE = \frac{1}{2}mv^2$
small angle formulae	*Kepler's 3rd law*	*velocity*	*acceleration*	*Newton's 2nd law*	*momentum*	*angular momentum*	*kinetic energy*

$E = mc^2$	$F = G\frac{M_1 M_2}{d^2}$	$a^3 = (M_1 + M_2)p^2$	$v_{orbit} = \sqrt{\frac{GM}{R}}$	$v_{escape} = \sqrt{\frac{2GM}{R}}$
mass energy	*gravity*	*Newton's form Kepler's 3rd*	*orbital velocity*	*escape velocity*

Now A130:

$P = \frac{E}{\Delta t}$	$c = \lambda f$	$E = hf = \frac{hc}{\lambda}$	$F = \sigma T^4$	$\lambda_{\max} = \frac{2.9 \times 10^6\, nm \cdot K}{T}$	$v_{radial} = \frac{\lambda_{shift} - \lambda_{rest}}{\lambda_{rest}} \times c$	$\theta = 2.5 \times 10^{5''}\frac{\lambda}{D}$
definition of power	*wave equation*	*photon energy*	*Stefan-Boltzmann*	*Wien's law*	*Doppler shift*	angular *resolution*

$\frac{LGP_A}{LGP_B} = \frac{\text{area}_A}{\text{area}_B} = \frac{(diam_A)^2}{(diam_B)^2}$	$M = \frac{f_{telescope}}{f_{eyepiece}}$	$\gamma = \sqrt{1 - \frac{v^2}{c^2}}$	$t_{moving} = t_{rest} \times \gamma$	$l_{moving} = l_{rest} \times \gamma$	$m_{moving} = \frac{m_{rest}}{\gamma}$
light gathering power	*magnification*	*gamma*	*time dilation*	*length change*	*mass increase*

$\Delta x \Delta p \geq \frac{h}{4\pi}$	$\Delta E \Delta t \geq \frac{h}{4\pi}$	$P = \frac{F}{A}$	$D = \frac{m}{V}$	$PV = nRT$	$d(pc) = \frac{1}{p''}$	$b = \frac{L}{4\pi d^2}$
uncertainty principle #1	*uncertainty principle #2*	**pressure*	**density*	*ideal gas law*	*distance parallax*	*apparent brightness*

$L = 4\pi d^2 b$	$L = 4\pi R^2 \sigma T^4$	$m - M = 5\log\left(\frac{d}{10}\right)$	$d = 10^{\left(\frac{m-M+5}{5}\right)}$	$(M_A + M_B) = \frac{a^3}{p^2}$
**luminosity #1*	*luminosity #2*	*distance #1*	*distance #2*	*star masses*