X-ray analysis Cheat Sheet

keV to erg	1 keV	=	1.602×10^{-9} erg	
Plank constant	h	=	6.626×10^{-27}	erg s
Exp time	T			sec
Exp map (pix i,j)	E_{ij}			cts photon^{-1} sec cm^2
Exp map (src avg)	E_S	=	$\sum_S E_{ij} / \sum_S 1$	cts photon^{-1} sec cm^2
		$\equiv$	$A_{\rm eff}$ T	Effective area * Time
Effective area	$A_{\rm eff}$	=	340	cm^2 (typical)
Src counts	C_S		Total cts in src reg	cts
Bkg counts	C_B		Total cts in bkg reg	cts
Net counts	C_N	=	$C_S - C_B \frac{\sum_S E_{ij}}{\sum_B E_{ij}}$	cts
Photon flux	$f_{\rm p}$	=	C_N / E_S	photons cm^{-2} sec^{-1}
Energy flux	f	=	$f_{\rm p} \cdot$ ECF	erg cm^{-2} sec^{-1}
Energy band	$h\nu_0$, $h\nu_1$		0.5, 8	keV
Power law spectrum	f_ν	=	$k\nu^\alpha \equiv k\nu^{1-\Gamma}$	erg cm^{-2} sec^{-1} Hz^{-1}
Energy index	α			Typical = -0.7
Photon index	Γ			Typical = 1.7
Energy Conv Factor	ECF	=	$h\nu_0 \frac{(\nu_1/\nu_0)^{\alpha+1} - 1}{(\nu_1/\nu_0)^\alpha - 1} \frac{\alpha}{\alpha+1}$	erg photons^{-1}
		=	2.83×10^{-9}	erg photons^{-1} (E=0.5-8 keV, $\Gamma = 1.7$)
Redshift	z			
Luminosity	L	=	$\int_{\nu_0}^{\nu_1} L_\nu d\nu$	erg
		=	$\int_{\nu_0/(1+z)}^{\nu_1/(1+z)} 4\pi d_l^2 \cdot f_\nu d\nu$	erg
		=	$\frac{4\pi d_l^2}{(1+z)^{\alpha+1}} \cdot f$	erg
		=	$K_{\rm corr} \cdot 4\pi d_l^2 \cdot f$	erg
K correction	$K_{\rm corr}$	=	$(1+z)^{\Gamma-2}$	
Luminosity dist	d_l	=	(from cosmology calc)	cm