228	(a)	(1)	E	=	hf	
			E	=	$6.63 \times 10^{-34} \times 1.2 \times 10^{27}$	1
			E	=	7.96×10^{-7} J	1
		(2)	E	=	$\frac{7.96 \times 10^{-7}}{1.6 \times 10^{-19}}$	
			E	=	$4.97 \times 10^{12}\ eV$	1
			E	=	$\frac{4.97 \times 10^{12}}{1 \times 10^{12}}$	
			E	=	4.97 TeV	1
	(b)		p	=	$\frac{h}{\lambda}$	
			p	=	$\frac{hE}{hc}$	
			p	=	$\frac{450 \times 10^{12} \times 1.6 \times 10^{-19}}{3 \times 10^{8}}$	1
			p	=	2.4×10^{-13} kg m s^{-1}	1
229	(a)		E	=	$\frac{hc}{\lambda}$	
			λ	=	$\frac{hc}{E}$	
			λ	=	$\frac{6.63 \times 10^{-34} \times 3 \times 10^{8}}{(2.11 \times 1.6 \times 10^{-19})}$	1
			λ	=	589 nm	1
	(b)		$\frac{N}{t}$	=	$\frac{P}{E}$	
			$\frac{N}{1}$	=	$\frac{P}{hf}$	
			N	=	$\frac{P\lambda}{hc}$	
			N	=	$\frac{150}{6.63 \times 10^{-34} \times 0.91 \times 10^{9}}$	1
			N	=	4.44×10^{20} photons/s	1
	(c)		p	=	$\frac{h}{\lambda}$	
			p	=	$\frac{6.63 \times 10^{-34}}{5.89 \times 10^{-7}}$	1
			p	=	1.13×10^{-27} kg m s^{-1}	1
230	(a)		λ	=	$\frac{h}{p}$	
			λ	=	$\frac{6.63 \times 10^{-34}}{2.67 \times 10^{-23}}$	1
			λ	=	2.48×10^{-11} m	1
	(b)		ΔE	=	$\frac{hc}{\Delta\lambda}$	
			ΔE	=	$\frac{6.63 \times 10^{-34} \times 3 \times 10^{8}}{0.71 \times 10^{-12}}$	1
			ΔE	=	2.80×10^{-13} J	1