48: 3, 7, 13, 16

49: 28, 31, 35, 43, 48

3) The polarizer removes half the intensity.

Hence S (Poynting vector) $= 6.1 \frac{mW}{m^2} = \frac{1}{2\mu_0} EB = \frac{1}{2\mu_0}\frac{E^2}{c}$

$$\Rightarrow E = \left[(6.1\times10^{-3})\, 2\,(4\pi\times10^{-7})(3\times10^{8})\right]^{1/2} = \boxed{2.14 \ V/m}$$

$\Delta p = \frac{E}{c}$ — momentum transfer

$$\frac{6.1\times10^{-3}}{3\times10^{8}} = 2.03\times10^{-11} \text{ Pascal}$$

$$\text{Pressure} = \frac{F}{A} = \frac{\Delta p}{\Delta t\, A} = \frac{\overset{\text{absorbed}}{U}}{c\,\Delta t\, A} = \frac{S\,A\,\Delta t}{c\,\Delta t\, A} = \frac{S}{c}$$

7) The first polarizer takes out ½ the intensity

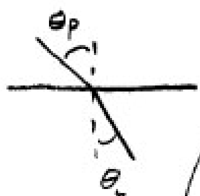
So $\underset{\text{thru 1}}{\tfrac{1}{2}} \times \underset{\text{thru 2}}{\cos^2 30} \times \underset{\text{thru 3}}{\cos^2 30} \times \underset{\text{thru 4}}{\cos^2 30} = \frac{1}{2}(\cos^2 30)^3 = \frac{1}{2}\left(\frac{\sqrt{3}}{2}\right)^6$

$= \boxed{21.1\%}$

13) $\tan\theta = \frac{4/3}{1} = 4/3 \Rightarrow \theta = \boxed{53.1^\circ}$

The index of refraction of H_2O is slightly frequency dependent, so also will be Brewster's angle

16)



$\sin\theta_p = n_2 \sin\theta_r$

$\tan\theta_p = n_2$

} Solve for n_2 + θ_p

$\sin(31.8) = .527$

28) $E = \frac{hc}{\lambda} = .6\,eV \Rightarrow \lambda = \frac{hc}{.6} = \frac{12400\,eV\text{-}A}{.6\,eV} \cong 20700\,Å$

This is very long wavelength,
in the far infrared

31) $E = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{E} = \frac{6.63\times10^{-34}\ 3\times10^{8}}{10^{-18}}$

replace with 10^{-16}

$\Rightarrow$ 2000 Å $\rightarrow$ 20 Å

ultraviolet

this is approaching
X-ray energies

So, higher energy than the
visible spectrum

35) $\frac{hc}{\lambda} = \varphi + \frac{1}{2}mv^2$

$\frac{hc}{6780\,Å} = 1.83\,eV$ .. So this photon does not have enough "umph" to overcome the metal's work function

$2.28 = \frac{hc}{\lambda} \Rightarrow \lambda = \frac{hc}{2.28} \cong 5440\,Å$ .. Green

43) $\frac{1.38\times10^{3}\,\frac{J}{s\,m^2}}{1.61\times10^{-19}} = 8.57\times10^{21}\,\frac{eV}{s\,m^2}$

Each photon has an energy of $\frac{hc}{5500\,Å} = 2.26\,eV$

Hence, # of photons per second per m^2 = $\frac{8.57\times10^{21}}{2.25} = 3.8\times10^{21}$

In one minute we get 60 times as many = 2.28×10^{23}

One mole = 6.02×10^{23} hence we need 6.02 [illegible]