Particles, Waves and Quanta: Set 11

Set	Problem	Solution
11	8	(a) Shows absorption of the short wavelengths (blue & violet) but transmission of the long wavelengths. This is a red filter. (b) Shows transmission of blue and red but absorption of middle frequencies, this is a purple filter. (c) Shows maximum transmission at 500nm – this is the wavelength of green light, this is agreen filter.
	9	Blueshift can occur in an expanding universe when an object is moving towards us, this may occur for example when observing spiral galaxies the side spinning towards us will be slightly blueshifted.
	10	The graph shows a fairly linear relationship between the speed at which a galaxy is receding and its distance from Earth. Thus the formula linking the two variables is: $v = H_o d$, where H_o is Hubble's constant. Drawing a line of best fit through zero and calculating rise/run (slope) at $d = 30$, we obtain a value for H_o of $\frac{17,000}{30}$ =570 km s^{-1} per Mpc. Note: There has been much debate and research on the value of the Hubble constant. The most up-to-date value for H_o is about 71 km s^{-1} per Mpc.