

PHAS1102 – Physics of the Universe

18 October 2011

Practice Problem sheet 2 – solutions will be posted w/c 24 Oct. 2011

1. Calculate how much energy is radiated into space per unit time by each square metre of the Sun's surface. Also determine the total power output of the Sun.
(Adopt a surface temperature = 5800K, and a solar radius = 6.96×10^5 km)
2. Based on the Sun's radiation, briefly explain why human eyes have evolved to be most sensitive to visible light. Imagine alien life were able to evolve on an exoplanet that has a star with a surface temperature five times that of the Sun. What wavelength-band would their vision be most sensitive to?
(Surface temperature of the Sun = 5800 K)
3. If a star has an apparent magnitude of -0.4 and a parallax of $0.3''$, what are the distance modulus, and the absolute magnitude?
4. The V magnitudes of two stars are both observed to be 7.5, but their blue magnitudes are $B_1 = 7.2$ and $B_2 = 8.7$. What is the colour index of each star? Which star is the bluer and by what factor is it brighter at blue wavelengths than the other star?