

THE UNIVERSITY OF QUEENSLAND

PRACTICE EXAMINATION, APRIL 2004

PHYS2080 ASTRONOMY B (SCIENCE)

TIME: ONE hour for working

NIL minutes for perusal before examination begins.

This examination consists of 50 questions, each of which has five possible responses. Only one response is allowed for each question. If two or more responses seem possible, choose the best or most nearly correct response. If you cannot answer the question and do not wish to guess, I will award one-quarter of the question value. Please indicate this by crossing out the question number.

**PUT YOUR NAME ON THE TYPE A ANSWER SHEET NOW.
BOTH SIDES.**

The examination paper is not used in the assessment (so anything you write on this paper is not used in the assessment) ~~but~~

~~THIS EXAMINATION PAPER MUST BE RETURNED WITH THE RESPONSE SHEET.~~

Begin with response 51 on side 2 of the ANSWER SHEET.

Calculators are permitted.

Some useful formulae, usual notation:

$$\begin{aligned} \frac{\ell_2}{\ell_1} &= 10^{0.4(m_1 - m_2)} & m_2 - m_1 &= 2.5 \log\left(\frac{\ell_1}{\ell_2}\right) & DM &= 5 \log\left(\frac{r}{10}\right) & A_V &\rightarrow 3E_{B-V} \\ T &= 4.74 \frac{\mu''}{\pi''} & (M_1 + M_2)p^2 &= a^3 & a &= \left(\frac{a''}{\pi''}\right) = ra'' & E &= h\nu = h \frac{c}{\lambda} \\ L &= 4\pi R^2 \sigma T_{\text{eff}}^4 & \lambda_{\text{max}} T &= 0.0029 & \sin(\theta) &= \beta = \frac{v}{c} & v &= c \frac{\Delta\lambda}{\lambda} \\ v &= Hr = \frac{r}{T_0} & \lambda &\rightarrow \frac{1239.8 \text{ nm}}{E(\text{eV})} \end{aligned}$$

Fundamental constants:

$$\begin{aligned} h &= 6.626196 \cdot 10^{-34} \text{ J}\cdot\text{s} & e &= 1.6021917 \cdot 10^{-19} \text{ C} & m_e &= 9.1095580 \cdot 10^{-31} \text{ kg} \\ c &= 299792458 \text{ m}\cdot\text{s}^{-1} & k &= 1.3806220 \cdot 10^{-23} \text{ J}\cdot\text{K}^{-1} & m_p &= 1.6726140 \cdot 10^{-27} \text{ kg} \\ G &= 6.673 \cdot 10^{-11} \text{ N}\cdot\text{m}^2\cdot\text{kg}^{-2} & N_A &= 6.022094 \cdot 10^{26} \text{ kmol}^{-1} & \text{amu} &= 1.660531 \cdot 10^{-27} \text{ kg} \\ \sigma &= 5.67 \cdot 10^{-8} \text{ Jm}^{-2}\text{deg}^4\text{s} & 0^\circ\text{C} &= 273.15 \text{ K} \end{aligned}$$

Astronomical and derived constants:

$$\begin{aligned} \text{pc} &= 206265 \text{ AU} = 3.26 \text{ LY} & \text{year} &\approx 3.1557 \times 10^7 \text{ s} & g &= 9.7895 \text{ ms}^{-2} \\ \text{eV} &= 1.6021917 \times 10^{-19} \text{ J} & \lambda(1 \text{ eV}) &\rightarrow 1239.8 \text{ nm} & g_{\text{sun}} &= 275 \text{ ms}^{-2} \\ L_{\text{sun}} &= 4 \times 10^{26} \text{ W} & M_{\text{sun}} &= 1.99 \times 10^{30} \text{ kg} & R_{\text{sun}} &= 6.96 \times 10^5 \text{ km} \\ \text{AU} &= 1.496 \times 10^8 \text{ km} & M_{V_{\text{sun}}} &= +4.79 & V_{\text{sun}} &= -26.78 \\ \text{pc} &= 206265 \text{ AU} & \text{pc} &= 3.26 \text{ light yr} & T_{0(H_0=72)} &= 13.7 \times 10^9 \text{ yr} \end{aligned}$$

H, He, Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni