SC1238 A3

1. $m_a - m_b = -2.5 \log(d_b^2/d_a^2)$

$\quad m_b = -2.5 \log(d_b^x/16 d_b^x) + 25$

$\quad\quad = 5.51$

2. a) $n = \dfrac{M_s}{M_p} \Big/ \left(\frac{4}{3}\pi R^3\right)$

$\quad = \dfrac{1.989 \times 10^{33}}{10^{-24}} \Big/ \left(\frac{4}{3}\pi (6.958 \times 10^{10})^3\right)$

$\quad = 1.39 \times 10^{24} \text{ particles}/\text{cm}^3$

b) $\because M = 18 m \sqrt{\dfrac{T^3}{n}}$

$\quad \therefore T = \left(\left(\frac{1}{18}\right)^2 n\right)^{\frac{1}{3}}$

$\quad = 1.63 \times 10^7 \text{ k}$

c) The actual internal core temp is 1.5×10^7 k, which is a bit lower than my estimate.

3. refer to plot.