Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic : 10_Space

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Name of the Student:____
Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	• Mean straight line with positive intercept on the y-axis (1)		1

Question Number	Acceptable Answer	Additional Guidance	Mark
(ii)	• $C = \frac{K}{4\pi d^2}$ used to show $\frac{1}{\sqrt{C}} \propto d$ (1) **Or** identifies gradient as $\sqrt{\frac{4\pi}{K}}$ which is constant • Since graph is a straight line, data is consistent with this (1) • However, line doesn't pass through the origin (1) • This indicates a <u>systematic</u> error in measuring the distance (1)		4

Q2.

Question Number	Answer		Mark
(a)(i)	Reverse direction for temperature [at least 2 values seen] Logarithmic/power temperature variation [at least 3 realistic values seen increasing by the same factor]	(1) (1)	**2**
(a)(ii)	QWC – Work must be clear and organised in a logical manner using technical wording where appropriate **Area 1: Max 2** The Sun is fusing/burning hydrogen (into helium in its core) When (hydrogen) fusion/burning ceases the core of the Sun cools [accept radiation pressure drops when fusion/burning ceases in the core] The core collapses/contracts (under gravitational forces) **Area 2: Max 2** The Sun expands and becomes a red giant The core becomes hot enough for helium fusion/burning to begin (in the core) Helium begins to run out and the core collapses again (under gravitational forces) **Area 3: Max 2** Idea that outer layers of Sun are ejected into space The temperature doesn't rise enough for further fusion to begin The core/Sun becomes a (white) dwarf star	(1) (1) (1) (1) (1) (1) (1) (1) (1)	**6**

(b)(i)	Idea of a very high temperature [accept value of about 10^7 K] To overcome repulsive/electrostatic forces between protons/nuclei **Or** so that protons/nuclei get close enough together for the strong (nuclear) force to act **Or** so that protons/nuclei get close enough to fuse Idea of a very high density [accept pressure] to give a sufficient collision rate	(1) (1) (1)	**3**
(b)(ii)	Attempt at calculation of mass deficit Use of $\Delta E = c^2 \Delta m$ Attempt at conversion from J to (M)eV $\Delta E = 12.9$ (MeV) [If correct mass defect in kg is converted into u and then 1u = 931 Mev used, then full marks may be awarded] <u>Example of calculation</u> $\Delta m = ((5.008238 \times 2) - 6.646483 - (1.673534 \times 2)) \times 10^{-27}\,\text{kg}$ $\Delta m = 2.2925 \times 10^{-29}$ kg $\Delta E = (3.00 \times 10^8\,\text{ms}^{-1})^2 \times 2.2925 \times 10^{-29}\,\text{kg} = 2.063 \times 10^{-12}\,\text{J}$ $\Delta E = \dfrac{2.063 \times 10^{-12}\,\text{J}}{1.60 \times 10^{-13}\,\text{J MeV}^{-1}} = 12.9\,\text{MeV}$	(1) (1) (1) (1)	**4**
	Total for question		**15**