


SECTION B

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			Nebula, protostar, mid star, red giant, planetary nebula, white dwarf, black dwarf		1		1		
	(b)			Radiation/light not absorbed by atmosphere			1	1		
	(c)			Any one of these 4 marked [with a cross]. If more than one marked then follow the rule 1 right + 1 wrong = zero 		1		1		
	(d)			Photons collide with matter in star (or equivalent) [1] Force is rate of change of momentum [1] Light has momentum (or $p = \frac{h}{\lambda}$) [1]	1 1	1		3		
	(e)			More massive linked to greater gravitational force [hence density greater] [1] Greater density linked to increased [rate of] fusion [1] Reference to energy released <u>by fusion</u> e.g. more energy released [1]		3		3		

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					AO1	AO2	AO3	Total	Maths	Prac
	(f)	(i)		$\lambda = \frac{0.0029}{T}$ used [1] Answer = 145 n[m] or $\frac{0.0029}{20\,000}$ seen (accept 17 000 K to 22 000 K from the graph) [1]	1	1		2	1	
		(ii)		Better to use UV or more radiation in UV or peak emission is not in visible range [1] [But] hot stars also emit visible light [more than colder stars] [1]			2	2		
	(g)			Choice of equation 1 e.g. $0.23 \times 0.2^{2.3}$ (=0.0057) [1] In (approximately) correct place (don't allow as a guess) [1]			2	2	2	
	(h)			Correct use of equation 3 e.g. $1.5 \times 10^{3.5}$ or 4 743 [1] Stated that luminosity or power or rate of use of fuel is 5 000× or 4 743× greater [1] Relevance of factor of 10 understood [1] Factor of 10 M_{\odot} and 5 000 L_{\odot} combined for a conclusion [1] e.g. $\frac{10}{5\,000}$ seen or $\frac{10}{4\,743}$ or worded answer e.g. although burning 5 000× faster, it has 10× more fuel so 500× less lifetime		4		4	2	
	(i)			As mass increases radius decreases or vice versa	1			1		
				Question 8 total	4	11	5	20	5	0