

Question			Marking details	Marks Available
7	(a)		<p>Any 2 (x1) from:</p> <p>Near stars move relative to distant stars [due to Earth orbit]</p> <p>More movement (or larger angle) means stars nearer (inversely proportional etc.) or accept parsec = 1/arcsec</p> <p>Parallax (or distance) can be measured from readings 6 months apart (or accept readings where Earth movement is known etc.)</p>	2
	(b)		4 parsec or angle = $1.5 \times 10^{11}/d$	1
			$4 \times 3.25 = 13$ [light year]	1
	(c)		10× distance gives <u>100 times</u> less intensity	1
			Substituting 1 and 0.1 into equation accept 1 and 10	1
			$m = M - 5$ and $m = M$ shown	1
			<p>Alternative:</p> <p>2.5^5 roughly equal to 100 award 2 marks</p>	
	(d)		1[%] Accept 0.01 but not 0.01 %	1
	(e)		Electrons need to be in the high energy levels	1
			They need to be in $n = 3$ (1 st mark can be implied in the 2 nd mark)	1
			Not possible because no ultraviolet to absorb or collisions don't have enough KE	1
	(f)		Comparison with $4\pi r^2 \sigma T^4$ or $b = 4\pi\sigma$	1
			Answer $b = 7.13 \times 10^{-7}$	1
			Unit = $\text{W m}^{-2} \text{K}^{-4}$ or equivalent	1

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	(g)	(i)	$T = 1$ (year) and $a = 1$ (AU) and $M = 1$ Accept because everything = 1	1
		(ii)	Assuming $M + m \approx 0.32 M_{\text{Sun}}$ $a = \sqrt[3]{0.32 \times 0.46^2} = 0.41$ [AU]	1 1
	(h)		Drop when large eclipses small	1
			And small eclipses large	1
			Bigger drop when the <u>hotter/brighter</u> star is blocked	1
			Award 3 marks for bigger drop when small in front of large	
			Question 7 Total	[20]