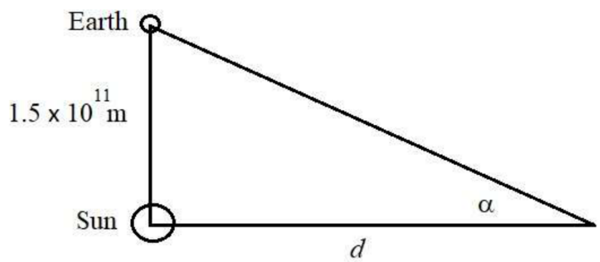
<table>
<tr><th>Question Number</th><th>Answer</th><th></th><th>Mark</th></tr>
<tr><td>18(a)(i)</td><td>Use of trigonometry to calculate distance
Or use of small angle approximation to calculate distance

Distance to Wolf 359 = 7.5×10^{16} (m)

<u>Example of calculation</u>



$\tan(2.01 \times 10^{-6}) = \dfrac{1.50 \times 10^{11}\ \text{m}}{d}$

$\therefore d = \dfrac{1.50 \times 10^{11}\ \text{m}}{2.01 \times 10^{-6}} = 7.46 \times 10^{16}\ \text{m}$</td><td>(1)

(1)</td><td>2</td></tr>
<tr><td>18(a)(ii)</td><td>Parallax angle decreases as distance from the Earth increases
Or parallax is only suitable for (relatively) close stars

As parallax angle is too small to measure for distant stars</td><td>(1)

(1)</td><td>2</td></tr>
<tr><td>18(b)(i)</td><td>λ_{max} read from graph
Use of $\lambda_{max}T = 2.898 \times 10^{-3}$ m K
T = 2680 (K) [accept 2635 K → 2760 K]

<u>Example of calculation</u>

$T = \dfrac{2.898 \times 10^{-3}\ \text{m K}}{1.08 \times 10^{-6}\ \text{m}} = 2683\ \text{K}$</td><td>(1)
(1)
(1)</td><td>3</td></tr>
<tr><td>18(b)(ii)</td><td>Use of $L = \sigma A T^4$
$L = 4.70 \times 10^{23}$ W (allow ecf from (b)(i))
Comparison of calculated value of L with L_{Sun} and appropriate conclusion
Or comparison of calculated L/L_{Sun} percentage with 0.1% and appropriate conclusion

<u>Example of calculation</u>

$L = 4\pi\,(0.16 \times 6.96 \times 10^{8}\ \text{m})^2 \times 5.67 \times 10^{-8}\ \text{W m}^{-2}\ \text{K}^{-4}\ (2700\ \text{K})^4$
$L = 4.70 \times 10^{23}\ W$
$\dfrac{L}{L_{\text{Sun}}} \times 100\% = \dfrac{4.70 \times 10^{23}\ W}{3.83 \times 10^{26}\ W} \times 100\% = 0.12\%$</td><td>(1)
(1)

(1)</td><td>3</td></tr>
</table>

Question Number	Answer	Mark