STAR MAGNITUDES, LUMINOSITIES, AND FLUXES

LUMINOSITY AND MAGNITUDES
The luminosity of a star can be found using that of the sun and their magnitudes: \( M_{\text{Sol}} = \) _______

LUMINOSITY COMPARED TO SOL FROM MAGNITUDES
\[
L_{\star, \text{sl}} = \left(10^{\frac{M_{\text{Sol}} - M_{\star}}{2.5}}\right) \text{Solar Luminosities}
\]
Eqn. (1)

LUMINOSITY IN WATTS
\[
L_{\star, \text{W}} = L_{\star, \text{sl}} \times (3.827 \times 10^{26}) \text{ Watts}
\]
Eqn. (2)

WARNING!! USE EXP OR EE KEY (NOT \( \times 10^{(26)} \) SEQUENCE!)

THE FLUX OF A STAR AT EARTH
The relationship between the luminosity of a star and the flux received at Earth is given by the inverse square law,

\[
F_{\oplus} = \frac{L_{\star, \text{W}}}{4\pi(r_{\star})^2} \text{ Watts/m}^2
\]
Eqn. (3)

using 1 light year = \( 9.46 \times 10^{15} \) meters and \( L_{\text{Sol}} = 3.827 \times 10^{26} \) Watts

\( r_{\star} \) must be in meters!

<table>
<thead>
<tr>
<th>STAR</th>
<th>FIELD GUIDE TO THE STARS AND PLANETS APPENDIX A2</th>
<th>CALCULATED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( V )</td>
<td>( M_V )</td>
</tr>
<tr>
<td>Polaris (α UMi)</td>
<td>2.0</td>
<td>-4.1</td>
</tr>
<tr>
<td>Vega (α Lyra)</td>
<td>0.03</td>
<td>0.6</td>
</tr>
<tr>
<td>Deneb (α Cyg)</td>
<td>1.25</td>
<td>-7.5</td>
</tr>
<tr>
<td>Altair (α Aql)</td>
<td>0.77</td>
<td>2.1</td>
</tr>
<tr>
<td>Betelgeuse (α Ori)</td>
<td>0.5</td>
<td>-5.0</td>
</tr>
</tbody>
</table>

Which of the Luminosities (compared to Sol) is noteworthy?

Deneb is AWESOME! \( 85,000 > \text{Sol}! \) And Betelgeuse is no wimp, either!

Should we warn people about starburn and sell “SPF 0.01 Starblock”?

No, the flux of the other stars is not enough to be a threat.