**STAR MAGNITUDES, LUMINOSITIES, AND FLUXES**

**LUMINOSITY AND MAGNITUDES**

The luminosity of a star can be found using that of the sun and their magnitudes: \( M_{\text{Sol}} = 4.82 \)

**LUMINOSITY COMPARED TO SOL FROM MAGNITUDES**

\[
L_{\star,\text{sl}} = \left(10^{\frac{M_{\text{Sol}} - M_{\star}}{2.5}}\right) \text{Solar Luminosities} \quad \text{Eqn. (1)}
\]

**LUMINOSITY IN WATTS**

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

**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,

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

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>
<th></th>
<th>L_{\star,\text{sl}} (Eqn. 1)</th>
<th>L_{\star} (Eqn. 2)</th>
<th>F_\oplus (Eqn. 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(V)</td>
<td>(M_V)</td>
<td>(r_{\star}) (ly)</td>
<td>(r_{\star}) meters</td>
<td>solar lum’s</td>
<td>Watts</td>
</tr>
<tr>
<td>Polaris ((\alpha) UMi)</td>
<td>2.0</td>
<td>-4.1</td>
<td>431</td>
<td>4.08 \times 10^{18}</td>
<td>3698</td>
<td>1.42 \times 10^{30}</td>
</tr>
<tr>
<td>Vega ((\alpha) Lyra)</td>
<td>0.03</td>
<td>0.6</td>
<td>25</td>
<td>2.37 \times 10^{17}</td>
<td>48.8</td>
<td>1.87 \times 10^{28}</td>
</tr>
<tr>
<td>Deneb ((\alpha) Cyg)</td>
<td>1.25</td>
<td>-7.5</td>
<td>1467</td>
<td>1.39 \times 10^{19}</td>
<td>84,723</td>
<td>3.24 \times 10^{31}</td>
</tr>
<tr>
<td>Altair ((\alpha) Aql)</td>
<td>0.77</td>
<td>2.1</td>
<td>17</td>
<td>1.61 \times 10^{17}</td>
<td>12.2</td>
<td>4.69 \times 10^{27}</td>
</tr>
<tr>
<td>Betelgeuse ((\alpha) Ori)</td>
<td>0.5</td>
<td>-5.0</td>
<td>522</td>
<td>4.94 \times 10^{18}</td>
<td>8,472</td>
<td>3.24 \times 10^{30}</td>
</tr>
</tbody>
</table>

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

**Deneb is AWESOME! 85,000 > 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.**