A good way make sense of new information is to plot the data on a graph. This lets us find patterns that might be hard to see just looking at numbers. These patterns often reveal underlying principles & provide insights into what we are studying. The table below shows the Luminosity (in units of the Sun's Luminosity, $L_{\text{SUN}}$) and Temperature (in Kelvins) for a few stars.

<table>
<thead>
<tr>
<th>Star</th>
<th>$L_{\text{STAR}} / L_{\text{SUN}}$</th>
<th>Temperature (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>1</td>
<td>5800</td>
</tr>
<tr>
<td>Proxima Centauri</td>
<td>0.002</td>
<td>3000</td>
</tr>
<tr>
<td>Vega</td>
<td>40</td>
<td>10,000</td>
</tr>
<tr>
<td>Delta ($\delta$) Orionis</td>
<td>70000</td>
<td>30,000</td>
</tr>
<tr>
<td>Arcturus</td>
<td>200</td>
<td>4300</td>
</tr>
<tr>
<td>Sirius B</td>
<td>0.06</td>
<td>25000</td>
</tr>
</tbody>
</table>

1.) First put the Sun on the graph below and label it. (Over...)
2.) A graph of a star's luminosity vs. temperature is called a "HR Diagram" (named for E. Hertzsprung and H.N. Russell). Now, plot the next three stars. Do you see a pattern? Lightly connect the first 4 stars with a broad line label it the "Main Sequence". Astronomers have found the reason for this pattern: All stars on the Main Sequence in this graph have the same source of energy as the Sun. What is this source of energy?

3.) But not all stars fit this pattern. Plot the location of Arcturus next, and label this star. Given that its temperature is much cooler than most stars, make a guess about its color:

Arcturus is also much brighter (higher luminosity) than main sequence stars of similar color. The larger a glowing sphere is, the more light it gives off. Measurements of stars like Arcturus reveal that they are HUGE, even 100 times the size of the Sun! Label this part of the H-R Diagram: "Giant Stars"

4.) Finally, graph Sirius B, on the HR Diagram. This dim star is orbiting the bright star Sirius, which is easily visible to the left of Orion's Belt. In spite of being too dim to see with our eyes, Sirius B is much hotter than the Sun! Just as giant stars glow more brightly, smaller stars are dimmer. Detailed study of the spectra of Sirius B showed it is about as small as the Earth, yet as massive as the Sun! Such White Dwarf stars are much older than the Sun, and no longer generate energy by Hydrogen Fusion. Label this part of your diagram.

5.) Analysis. If Sirius B were a Main Sequence star with the same temperature, roughly how many times brighter (more luminous) would it be?