**The Hertzsprung-Russell Diagram**

Plot the stars from the two lists of brightest and nearest stars on the Hertzsprung-Russell diagram on the next page. Use the intrinsic brightness (**absolute magnitude**) on the y-axis and the **temperature** on the x-axis. Note that the y-axis has negative magnitudes (the brightest stars) at the top and positive magnitudes (the dimmest stars) at the bottom. The x-axis is also “backwards,” with hot stars on the left side and cool stars on the right side. Use a different color pen (or a pen and a pencil) for each group of stars to see how they differ.

a. What general trends do you see in the data in the plot?

b. Draw a line following the main sequence defined by the nearest and the brightest stars together. Draw a circle encompassing any white dwarf stars and a circle encompassing any giant or supergiant stars. List the giants and supergiants below. Also list any white dwarf stars.

c. How do the two groups of stars differ in the Hertzsprung Russell diagram? Where is each group preferentially found in the diagram? Why

**The Brightest Stars in the Sky**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Distance (light years)** | **Apparent Magnitude** | **Absolute Magnitude** | Temperature |
| Sun | - | -26.72 | 4.8 | 5800 |
| Sirius | 8.6 | -1.46 | 1.4 | 9600 |
| Canopus | 74 | -0.72 | -2.5 | 7600 |
| Rigil Kentaurus | 4.3 | -0.27 | 4.4 | 5800 |
| Arcturus | 34 | -0.04 | 0.2 | 4700 |
| Vega | 25 | 0.03 | 0.6 | 9900 |
| Capella | 41 | 0.08 | 0.4 | 5700 |
| Rigel | ~1400 | 0.12 | -8.1 | 11,000 |
| Procyon | 11.4 | 0.38 | 2.6 | 6600 |
| Achernar | 69 | 0.46 | -1.3 | 22,000 |
| Betelgeuse | ~1400 | 0.50  | -7.2 | 3300 |
| Hadar | 320 | 0.61  | -4.4 | 25,000 |
| Acrux | 510 | 0.76 | -4.6 | 26,000 |
| Altair | 16 | 0.77 | 2.3 | 8100 |
| Aldebaran | 60 | 0.85 | -0.3 | 4100 |
| Antares | ~520 | 0.96  | -5.2 | 3300 |
| Spica | 220 | 0.98  | -3.2 | 2600 |
| Pollux | 40 | 1.14 | 0.7 | 4900 |

**The NEAREST STARS – Stars within about 12 light years of the Sun**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | Distance (light years) | **Apparent****Magnitude** | **Absolute Magnitude** | **Temperature** |
| Proxima Centauri | 4.24 | 11.10 | 15.53 | 2800 |
| Alpha Centauri A | 4.35 | -0.01 | 4.37 | 5800 |
| Alpha Centauri B | 4.35 | 1.34 | 5.72 | 4900 |
| Barnard's Star | 5.98 | 9.54 | 13.23 | 2800 |
| Wolf 359 | 7.78 | 13.46 | 16.57 | 2700 |
| Lalande 21185 | 8.26 | 7.48 | 10.46 | 3300 |
| Sirius A  | 8.55 | -1.46 | 1.45 | 9900 |
| Sirius B  | 8.55 | 8.44 | 11.34 | 12,000 |
| Luyten 726-8A | 8.73 | 12.56 | 15.42 | 2700 |
| UV Ceti | 8.73 | 12.52 | 15.38 | 2600 |
| Ross 154 | 9.45 | 10.45 | 13.14 | 3000 |
| Ross 248 | 10.32 | 12.29 | 14.79 | 2799 |
| Epsilon Eridani | 10.52 | 3.73 | 6.19 | 5084 |
| Lacaille 9352 | 10.74 | 7.34 | 9.75 | 3626 |
| Ross 128 | 10.92 | 11.13 | 13.51 | 3180 |
| EZ Aquarii | 11.27 | 13.33 | 15.64 | 2650 |
| Procyon A | 11.27 | 0.38 | 2.66 | 6530 |
| Procyon B | 11.27 | 10.70 | 12.98 | 7740 |
| 61 Cygni A | 11.40 | 5.21 | 7.49 | 4526 |
| 61 Cygni B | 11.40 | 6.03 | 8.31 | 4077 |
| Gliese 725 | 11.53 | 8.90 | 11.16 | 3680 |
| Gliese 15 | 11.62 | 8.08 | 10.32 | 3730 |
| Epsilon Indi | 11.82 | 4.69 | 6.89 | 4630 |

