Plotting Pulsating Variable Stars on the H-R Diagram:

Plot the variable stars in Table I on the H-R diagram. Variables have two absolute magnitude (M_V) values, one at maximum and one at minimum. They also have enough variation to change spectral classes. To show the entire cycle of change for variable stars, it is necessary to plot them twice – at maxima and minima. The spectral class column gives the spectral class at both maximum (left) and minimum (right), and the absolute magnitude (M_V**)** column gives the range from maximum (left) to minimum (right).

1.) Plot each star at both maximum and minimum absolute magnitude (M_V) along with the corresponding spectral class. For example, RT Aur will be plotted at (F4, -3.4) and again at (G1, -2.6).
2.) Draw a line connecting the two points.
3.) Identify the type of each variable star by the location of its position on the H-R diagram, and write it next to the star in the table below.
4.) Identify the main sequence, giant and supergiant branches and white dwarf branch on the diagram. Label the variable stars by the following letters: Cepheids – C, Miras – M, RR Lyraes – RR, Semiregular – SR.

Table I: Variable Stars

Star	**Type**	**Distance (parsecs)**	**Spectral Class**	**Absolute Magnitude (M_V)**
RT Aur		480	F4 to G1	-3.4 to -2.6
Delta Cep		300	F5 to G1	-3.9 to -3.0
Rho Cas		3600	F8 to K0	-8.7 to -6.6
T Cas		1700	M6 to M9	-3.2 to +0.8
TU Cas		1100	F3 to F5	-3.3 to -2.0
UU Aur		560	C5 to C7	-0.9 to +1.3
Chi Cyg		106	S6 to S10	+0.0 to +8.2
X Cyg		680	F7 to G8	-3.3 to -2.3
T Cep		210	M5 to M8	-0.6 to +3.7
Y Oph		880	F8 to G3	-3.8 to -3.3
RS Boo		1300	A7 to F5	-0.9 to +0.2
VX Her		2100	A4 to F4	-1.7 to -0.4

* The absolute magnitudes were calculated from parallax measurements and apparent magnitude (Hp) measurements taken from The European Space Agency, *et al., The Hipparcos and Tycho Catalogues* (17 Vols.), Noordwijk, The Netherlands: ESA Publications Division, 1997. ISBN 92-9092-399-7 (Vols. 1-17).