Name:
Group Member Names:

Getting to know the HR Diagram

Start out here: https://starinabox.lco.global/ Open the lid in Advanced. (all links are available on fizzixprof site)

The y-axis of the HR diagram is how bright the star is. The x-axis is the temperature, however, it goes from being hot on the left to being cool on the right – it seems backwards. Play around with the site and follow stars with different masses before answering the questions below.

1. Describe the path a typical star like our sun takes throughout its lifecycle.

2. Does every star start out on the main sequence? Does every star end in the same location?

3. Do the stars take the same amount of time to go through different stages?

4. The box on the right that shows the star size in comparison to our Sun can also show surface temperature, brightness and mass. Click through the different options for a few different stars. Where in a stars life cycle is it the coldest? The hottest?

Now move to this interactive HR diagram. http://astro.unl.edu/mobile/HRdiagram/HRdiagramStable.html

5. How does the size of a star near the top left of the H-R diagram compare with a star of the same luminosity near the top right of the H-R diagram?

6. How is it possible that stars so different have the same brightness? What else must be going on here?

7. What statement can you make about stars as they move from the left of the diagram to the right?

8. What statement can you make about stars as they move from the bottom of the diagram to the top?

9. Choose Plots from the upper right and see how the different stars line up on the diagram. Where are the brightest stars – what area or areas of the graph have the most of them?

10. Which plot, brightest or closest, is a better representation of the average star in our galaxy? Give an explanation for your answer.

11. A white dwarf is a very hot star, yet it is dim. Explain how this is possible.

This diagram does not include temperature, look up the approximate temps for each spectral class and write them in at the top of the graph.

12. What is hotter, a B0 star or a B9 star?

13. Would a red giant be brighter than a white dwarf? Which one is hotter?

14. Where would you plot the Sun on this graph? In order to answer this question, look at the left side. Notice that brighter stars have more negative absolute magnitudes. The sun has a 4.8 absolute magnitude. Find the right square and shade it in so that you know it's the Sun.

Plot two groups of stars on your HR diagram. Skim the questions at the end before you get started.

Table 2: Nearby Stars

Star	***Abs. Mag***	***Type***
Sirius A	1.4	A1
Procyon A	2.6	F5
Rigil Kentaurus	4.4	G2
Sun	4.8	G2
Alpha Cen B	5.7	K1
Epsilon Eri	6.1	K2
61 Cyg B	8.4	K5
BD +43	10.4	M1
BD +59	11.9	M3
Barnard's Star	13.2	M4
Ross	14.8	M5
Proxima Centauri	15.5	M5
Wolf	16.7	M6

Table 1: Bright Stars

Star	***Abs. Mag***	***Type***
Deneb	-8.3	A2
Rigel	-7.8	B8
Eta Carinae	-7	O1
Canopus	-5.53	F0
Mintaka	-5	O9

Bellatrix	-4.3	B2
Spica	-3.4	B1
Aldebaran	-.8	K5
Capella	0.4	G1
Vega	0.58	A0
Polaris	1	F8
Castor	1.2	A1
Sirius A	1.4	A1

15. After you complete your plotting of Table 1, describe the mix of stars you see on the diagram.

16. Similarly, after you complete your plotting of Table 2, describe how that mix has changed, if at all.

17. If you could plot all the stars in our entire galaxy, what area of the HR Diagram do you think would be the most populated? Explain your choice.