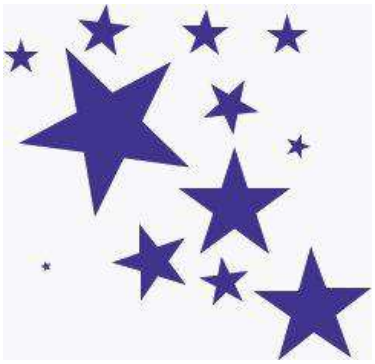
The Hertzsprung-Russell Diagram

Objective: Students will plot, label and interpret the Hertzsprung Russell Diagram.



Background: You and your classmates are about to create a giant HR Diagram, a chart that revolutionized the study of stars. You will have a labeled chart and a series of points to plot. From these points, you can deduce a lot of information about stars! Please read the directions in each step of the activity closely before answering questions.

Each of the star data points has the following information:

- ★ Star Name: the common or catalog name of the star
- ★ Temperature: the temperature of the surface of the star
- ★ Brightness: the number of times brighter the star is than our Sun (a fractions means it is dimmer than our Sun)
- ★ Expected Lifetime: the number of years the star is expected to exist based on color and brightness

Getting Started: Making the HR Diagram

1. Each person put 4 stars on the chart.
   Write down 3 observations about what you see so far.

2. Work together to put the rest of the stars on the HR diagram. Then make 2 additional observations about what you see.

3. Describe the 2-3 groups of stars that fall outside of the main trend line the chart.

4. What variable is located on the x-axis? _____

5. What variable is located on the y-axis? _____

6. Fill in the following chart with information from the stars on the chart.

Color	Temperature (K)	Brightness	Lifetime
Dark Blue			
Light Blue			
Yellow			
Orange			
Red			

Color (6 points)

7. The temperature of the hottest stars is _____.

8. The color of the hottest stars is _____.

9. The temperature of the coldest stars is _____.

10. The color of the coldest stars is _____.

11. The life expectancy of a very hot star is _____ years.

12. The life expectancy of a very cold star is _____ years.

Magnitude (6 points)

13. The temperature of the brightest stars is _____.

14. The color of the brightest stars is _____.

15. The temperature of the dimmest stars is _____.

16. The color of the dimmest stars is _____.

17. The life expectancy of a very bright star is _____ years.

18. The life expectancy of a very dim star is _____ years.

Fusion (2 points)

19. Look up the word fusion in your textbook and *define it in your Glossary*. Explain why the hottest, brightest stars have a very different life expectancy from the coldest, dimmest stars.

Labeling the HR Diagram

1. Take a look at 4 red stars from different parts of the HR Diagram. Record their information in the chart at right.

Star Name	Brightness	Temperature (K)

2. Describe the differences between the stars.

3. Use the internet to define the following types of stars:

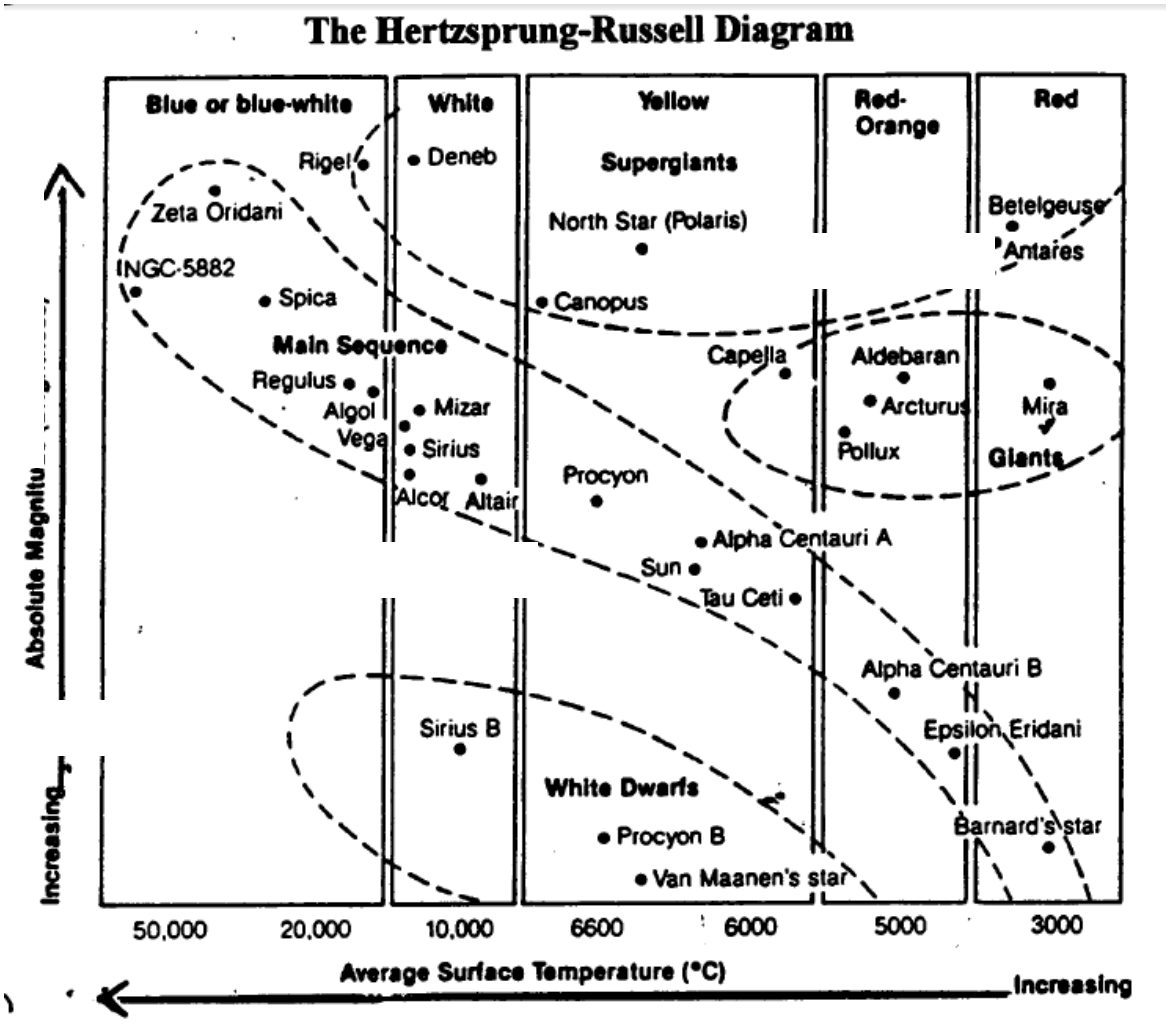
   Main sequence-

   red giant-

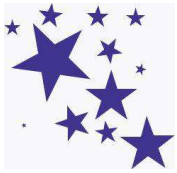
   supergiant-

   white dwarf-

4. Now that you have completed constructing and labeling the HR Diagram, add COLOR to the chart below.



Conclusion Questions



Directions: Answer the following questions in 2-3 complete sentences. Be sure to address all aspects of the question.

1.) What is the relationship between temperature/color and brightness in the HR Diagram (2 points)?

2.) What is the relationship between temperature/color and expected lifetime? Which stars will die first and why? (2 points)

3.) Explain how we know that there are red giants ***and*** supergiants on the HR Diagram (HINT: Refer to questions 1 and 2 on page 3) (2 points).

4.) Compare and contrast the Sun and Antares in terms of brightness, color and temperature using the diagram on the previous page (3 points).

5.) Explain in 1-2 sentences what the Hertzsprung-Russell diagram shows (1 point).