Physical Science 2022
Ms. Tobin

Name: _____
Date: _____Per **1 2 3 4 5 6**

Star Classification Lab

Why don't all stars look the same? Just like people, stars follow a **life cycle.** The **mass** of the star is the most important factor that determines which life cycle a star will follow. Stars can be classified into groups by their **color, size, luminosity, and temperature**. The **Hertzsprung- Russell** (HR) diagram is the most common way for astronomers to classify stars. In the HR diagram, the x-axis is labeled in *Degrees Kelvin* with the highest temperature at the origin. The Y-axis is labeled in *Absolute Luminosity* where a value of 1 means that the star is the same brightness as the sun. A value less than one means the star is that fraction of the brightness of the sun.

Target: I can use star data to recreate a Hertzsprung Russell Diagram and use it to identify relationships between color, size, temperature, and luminosity. I can describe how astronomers use the HR diagram to determine information about a star by comparing known characteristics of other similar stars.

Materials: Handout, pencil, cut out stars, large flat surface to spread out the stars

Procedure

1. Spread out the stars on your table to examine them carefully.
2. Become familiar with the stars and write down 3 observations.
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   -
   -
3. Arrange the stars on your table into groups. Describe the criteria you used to classify the stars: _____

4. Identify 3-4 other criteria that could be used to classify the stars.

5. Arrange the stars into groups by **color, size, (mass-radius), luminosity (brightness) and by temperature**. For each arrangement, record what you noticed about the group in the data tables below.

Data Table 1: Color

List at 3 observations - Do you notice any relationship between color and size, luminosity, or temperature?	
1.	
2.	
3.	

Data Table 2: Luminosity

	List at 3 observations - Do any patterns exist?
1.	
2.	
3.	

Data Table 3: Mass (Size)

	List at 3 observations - Do any patterns exist?
1.	
2.	
3.	

Data Table 4: Temperature

	List at 3 observations - Do any patterns exist?
1.	
2.	
3.	

Make your own H-R Diagram

Each star kit should contain 25 stars from the list below. Make your own H-R Diagram on your table and have it checked by your teacher.

A. Use the data provided on the stars to plot them on the HR diagram on the back of this paper.
B. Color and label each plot point with the name of the star.

Achemar	Altair	Eridani	Procyon	Spica
Alcor	Antares	Epsilon	Procyon B	Sun
Aldebaran	Barnard's Star	Mira	Regulus	Tau Ceti
Algol	Betelgeuse	Mizar	Sirius	Van Maanen
Alpha Centauri A		Polaris	Sirius B	Vega
Alpha Centauri B				

1. Describe the relationship between the **color** of a star and its **temperature**. Give an example.

2. Describe the relationship between the **luminosity** of a star and its **temperature <u>on the Main Sequence</u>**. Give an example.

3. Which combination of criteria (mass, temperature, luminosity, color) does not seem to have a relationship? Explain.

STOP AND READ:

PLOT THE STARS ON THE HR DIAGRAM ON THE NEXT PAGE **<u>BEFORE</u>** ANSWERING THESE QUESTIONS

Hertzsprung-Russell Diagram

4. **Draw a circle** around the grouping of stars that are considered <u>main sequence stars</u> on the diagram above. (Hint: The main sequence is the diagonal line of stars spanning from upper left to lower right)

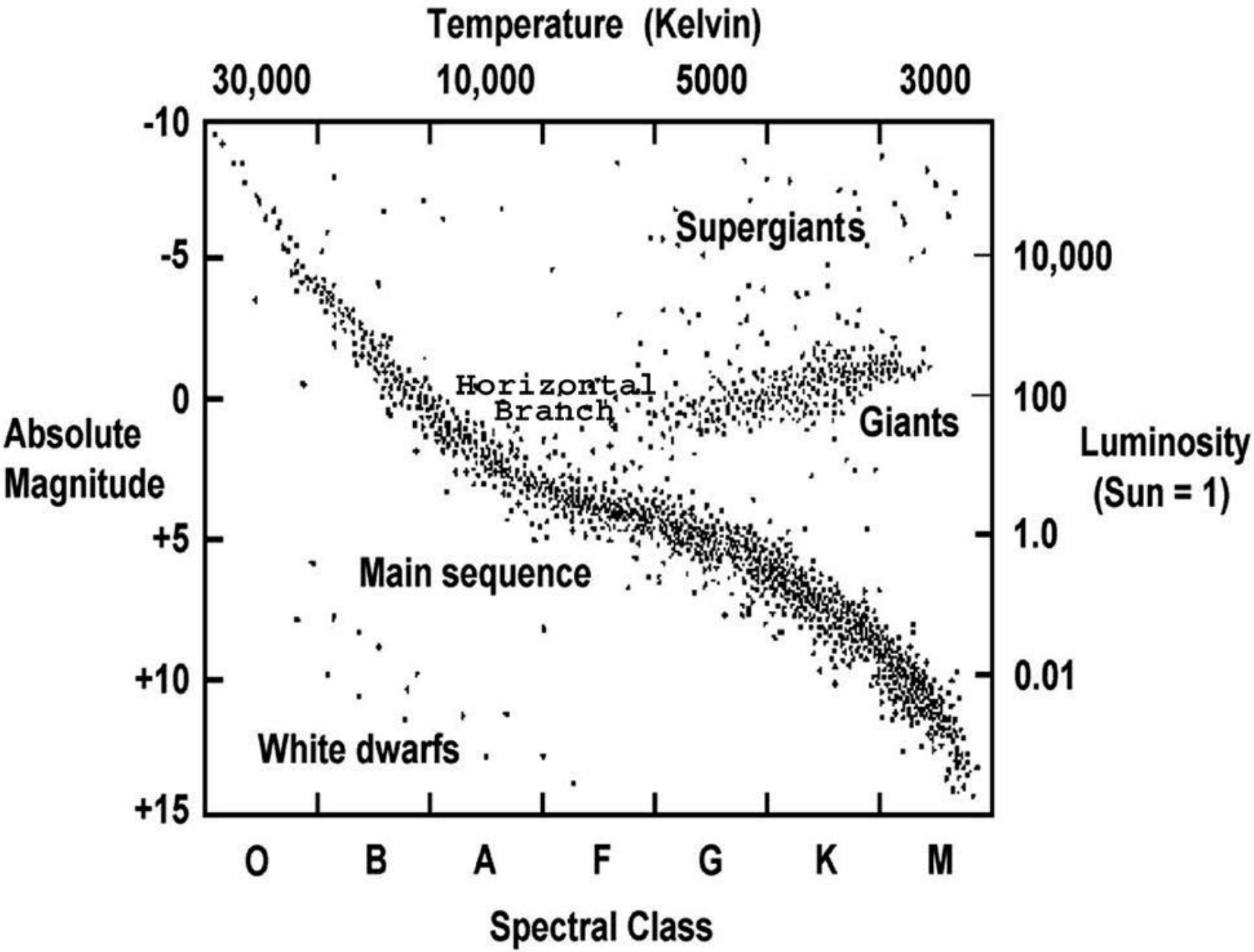
5. Looking at your HR Diagram, <u>locate the star Spica</u>. Use your Lifecycle of Stars poster and notes to answer the following questions:

    a. What **stage** of its life cycle is Spica in?

    b. What does this tell you about the star in terms of age? (young, middle age, older)

    c. Which **element** should it currently be fusing while on the main sequence?

    d. If Spica is similar in mass to our Sun, how will Spica end its life?



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