

Name _____
 Period _____

Date _____
 Lab _____

THE HERTZSPRUNG-RUSSELL DIAGRAM

Astronomers use two basic properties of stars to classify them. These two properties are luminosity and surface temperature. Luminosity usually refers to the brightness of the star relative to the brightness of our sun. Astronomers will often use a star's color to measure its temperature. Stars with low temperature produce a reddish light while stars with high temperatures shine with a brilliant blue-white light. Surface temperatures of stars range from 3000 degrees Celsius to 50,000 degrees Celsius. When these surface temperatures are plotted against luminosity, the stars fall into groups. Using data similar to what you will plot in this activity, Danish astronomer Ejnar Hertzsprung and US astronomer Henry Norris Russell independently arrived at similar results in what is now commonly referred to as the HR diagram.

Purpose: To make a Hertzsprung-Russell diagram.

Procedure:

- Plot the stars listed in the data table at right on the graph paper provided.
- Draw a circle around each grouping of stars on your graph.
How many groups did you circle? _____
- Label the following on your graph: main sequence, red giants, white dwarfs, supergiants.
- Circle the dot representing the sun. What type of star is the sun? _____

| STAR | LUMINOSITY (X SUN) | SURFACE TEMPERATURE (X 1000°C) | STAR | LUMINOSITY | SURFACE TEMPERATURE (X 1000°C) |
|---------------|-----------------------|--------------------------------------|--------------------|------------|--------------------------------------|
| 1. Orion | 10,000 | 20 | 2. Betelgeuse | 20,000 | 3 |
| 3. Polaris | 6 | 5.9 | 4. Achernar | 2,000 | 24 |
| 5. Antares | 1,000 | 3 | 6. Aldebaran | 100 | 4 |
| 7. Spica | 800 | 25 | 8. Ceti | .1 | 4.5 |
| 9. Vega | 40 | 12 | 10. Sirius A | 20 | 11 |
| 11. Procyon A | 50 | 6.9 | 12. Sun | 1 | 5.7 |
| 13. Regulus | 1,000 | 18 | 14. Procyon B | .004 | 6.6 |
| 15. Lacaille | .02 | 4.5 | 16. Altair | .01 | 9 |
| 17. Sirius B | .01 | 8 | 18. Alpha Centauri | 1.6 | 5.7 |

Conclusions:

- How many types of stars are shown on the HR diagram? _____
- How do the brightness and temperature of the sun compare with those of other stars?

- What is the relationship between luminosity and temperature for stars on the main sequence?

- Is there a relationship between mass and luminosity for stars on the main sequence?
 _____ If so, state the relationship.

NAME _____

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