Name: _____   Modern Astronomy

Date: _____ Period: _____   Earth Science

Lab Activity: Stars and Stellar Evolution

INTRODUCTION:

A star's actual brightness is related to its temperature and size. In the beginning of the 20th Century, two independent astronomers developed a graph of this relationship. This graph has been named the Hertzsprung-Russell (H-R) Diagram after these two scientists.

Stars are classified based upon their luminosity, color, temperature, and size. While the temperature of the star is related to its color, the apparent brightness varies with distance from Earth.

OBJECTIVE:

You will plot the location of stars on the H-R Diagram and determine some of their characteristics.

VOCABULARY:

Star -

Nuclear Fusion -

H-R Diagram -

Luminosity -

Main Sequence -

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PROCEDURE A:

1. Using Data Chart A, plot and label each star's position on the Hertzsprung-Russell Diagram.

2. Using Data Chart B, lightly color in vertical bands on the Hertzsprung-Russell Diagram that represent the temperatures of the stars.

3. In the blank boxes provided on the H-R Diagram, label the location of the following groups of stars using your Earth Science Reference Tables.

DATA CHART A

Star	Temperature [K]	Luminosity	Star	Temperature [K]	Luminosity
Sun	5,700	1	Aldebaran	4,000	500
Spica	25,000	50,000	Rigel	11,000	100,000
Bellatrix	18,000	1000	Deneb	8,800	900,000
Beta Centauri	21,000	1,000	Betelgeuse	3,200	100,000
Sirius	9,000	20	Epsilon Indi	4,800	0.1
Vega	9,500	90	Polaris	6,000	5,000
Alpha Centauri A	5,700	5	Barnard's Star	3,100	0.005
Pollux	4,700	75	Altair	7,500	10
Ross 248	2,500	0.0001	40 Eridani B	18,000	0.01
Proxima Centauri	2,800	0.001	Procyon B	8,900	0.001
Beta Carinae	9,500	100	Antares	3,200	7,500

DATA CHART B

Star Temperature [K]	Star Color
2,000 - 3,500	Red
3,500 - 5,000	Orange
5,000 - 7,500	Yellow
7,500 - 11,000	White
11,000 - 30,000	Blue

HERTZSPRUNG-RUSSELL DIAGRAM
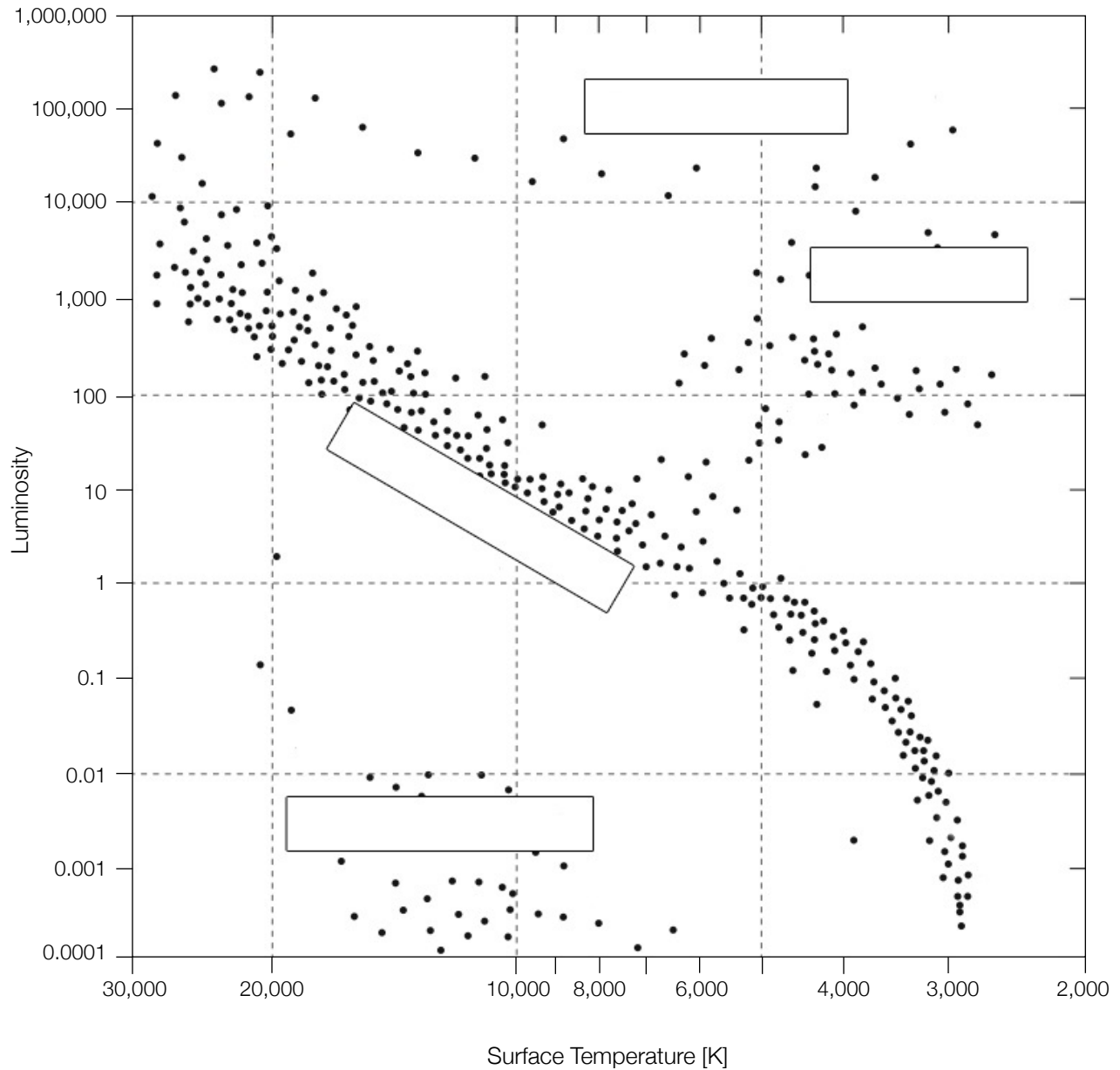
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DISCUSSION QUESTIONS:

1. Describe the Sun in terms of luminosity, temperature, and color?

2. What is the relationship between star temperature and luminosity in the Main Sequence?

3. What would be the luminosity of a main sequence star with a temperature of 25,000 K?

4. Why do supergiant stars, such as Betelgeuse, have high luminosity?

5. Why do white dwarf stars, such as Procyon B, have low luminosities?

CONCLUSION: How can stars be classified using the Hertzsprung-Russell Diagram?