

The H-R Diagram- Stellar Luminosity and Temperature

Introduction: Astronomers use two basic properties of stars to classify them. These two properties are luminosity, or brightness, and surface temperature. Astronomers will often use a star's color to measure its temperature. Stars with low temperature produce a reddish light, while stars with high temperature shine with a brilliant blue-white light. Surface temperatures of stars range from 2,000 Kelvin to 50,000 Kelvin. When these surface temperatures are plotted on a graph against luminosity, the stars fall into groups.

Problem: To create a Hertzsprung-Russell diagram.

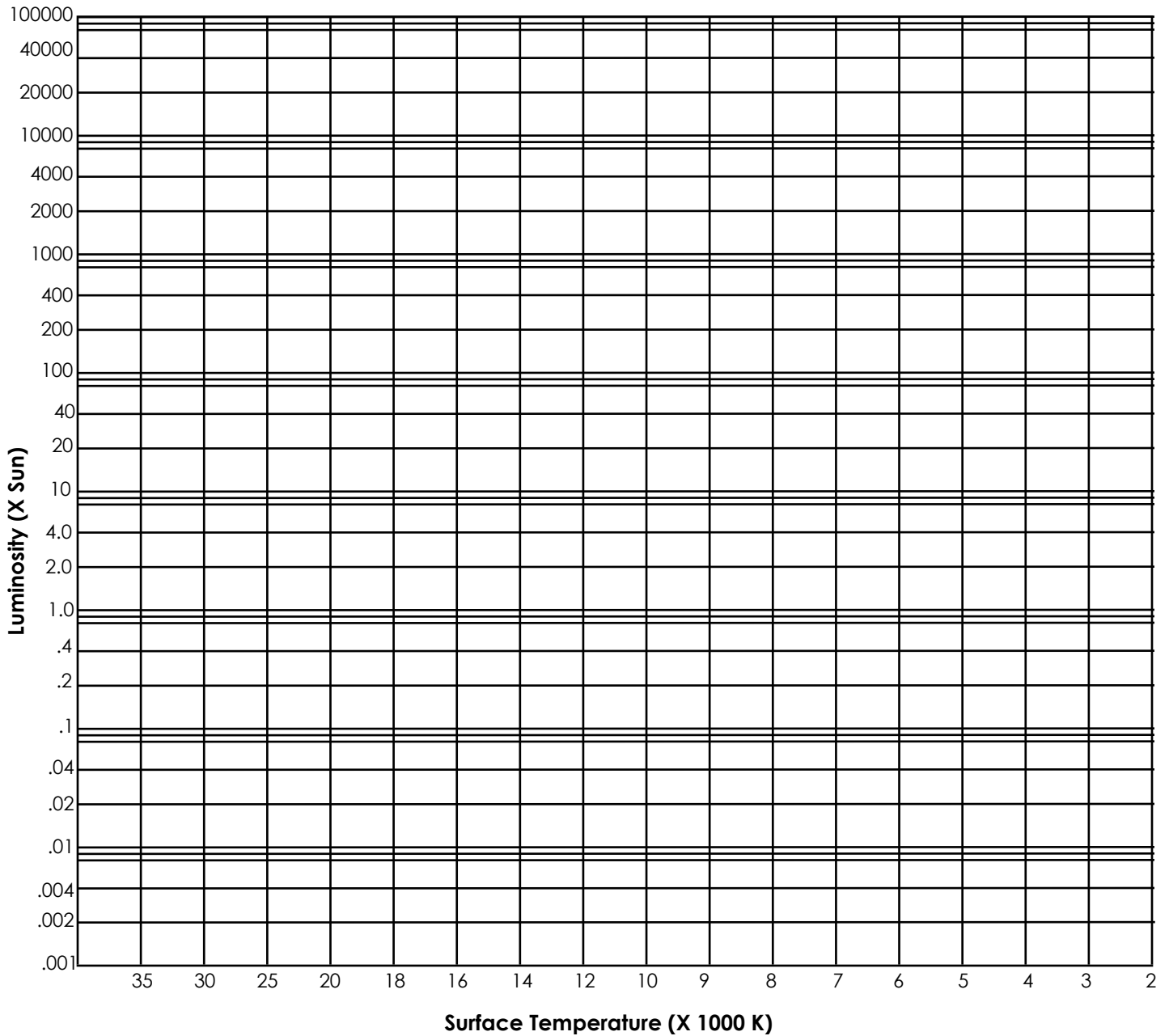
Procedures:

1. Plot the stars listed below on the graph paper provided.
2. Draw a circle around each grouping of stars on the graph.
3. Label the following on your graph: **Main Sequence, Red Giants, White Dwarfs, Supergiants.**
4. Circle the dot representing the Sun.

Star	Luminosity (X Sun)	Surface Temperature (X 1000 K)
Orion	10,000	20
Polaris	6	5.9
Antares	1,000	3
Spica	800	25
Vega	40	12
Procyon A	50	6.9
Regulus	1,000	18
Lacaille	0.02	4.5
Sirius B	0.01	8
Betelgeuse	20,000	3
Achemar	2,000	24
Aldebaran	100	4
Ceti	0.1	4.5
Sirius A	20	11
Sun	1	5.7
Procyon B	0.004	6.6
Altair	0.01	9
Alpha Centauri	1.6	5.7

Name: _____ Date: _____ Period: _____

Complete the graph below.



Conclusion Questions:

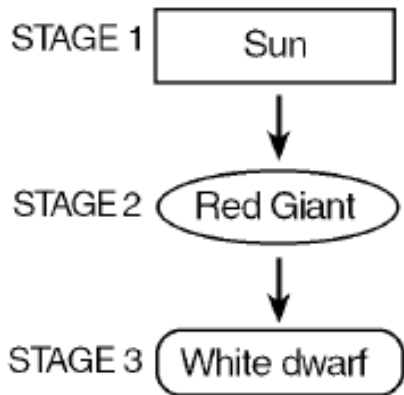
1. How many types of stars are shown on the H-R Diagram? _____
2. How does the temperature and luminosity of the Sun compare to that of the other stars on the Main Sequence? _____
3. What is the relationship between luminosity and temperature for stars on the Main Sequence? _____
4. Which is the hottest star plotted? _____ the brightest? _____

Regents Questions:

1. According to the *Luminosity and Temperature of Stars* Earth Science reference table, the Sun is classified as a
- A) blue supergiant star with a temperature of approximately 20,000K and a luminosity of 700,000
 - B) main sequence star with a temperature of approximately 5,500K and a luminosity of 1
 - C) main sequence star with a temperature of approximately 4,000K and a luminosity of 100
 - D) white dwarf star with a temperature of approximately 10,000K and a luminosity of 0.01

2. Which star is cooler and many times brighter than Earth's Sun?
- A) Rigel
 - B) Betelgeuse
 - C) Barnard's Star
 - D) Sirius

3. Stars are believed to undergo evolutionary changes over millions of years. The flowchart below shows stages of predicted changes in the Sun.



According to the *Luminosity and Temperature of Stars* Earth Science reference table and the flowchart above, the Sun will become

- A) hotter and brighter in stage 2, then cooler and dimmer in stage 3
- B) cooler and dimmer in stage 2, then hotter and brighter in stage 3
- C) cooler and brighter in stage 2, then hotter and dimmer in stage 3
- D) hotter and dimmer in stage 2, then cooler and brighter in stage 3

Name: _____ Date: _____ Period: _____