

SCORE  
(5 pts max)

ASTRONOMY 5  
THIRD HOUR SESSION "G"

ACTIVITY: The Hertzsprung-Russell Diagram

NAME KEY-G

DATE

ID#

Note: Use your SC001/SC002 star charts and Starry Nights software as needed.

1. Label the horizontal and vertical axes, and indicate the units on the scales.
2. At the bottom of the chart, write the 7-letter spectral type sequence.
3. On the HR diagram on the next page, indicate the locations of the following:  
— Main Sequence — Giants — Supergiants — White Dwarfs
4. What spectral type is plotted on the far \_\_\_\_\_ LEFT \_\_\_\_\_ of the HR diagram? What is the spectral type of the Sun?

O

G2

5. What luminosity class (or classes) includes \_\_\_\_\_ Supergiant \_\_\_\_\_ stars?

I

6. Stars with extremely \_\_\_\_\_ HIGH LUMINOSITY \_\_\_\_\_ are plotted where on the HR diagram (top/bottom/left/right)?

Top

7. What is the name of the bright star found near RA=  $5^{\text{h}} 17^{\text{m}}$  \_\_\_\_\_ and DEC= \_\_\_\_\_  $+46^{\circ}$  \_\_\_\_\_? What constellation is it in?

Capella

Auriga

8. Using Starry Nights, what is the temperature and luminosity of the star from question #7?

5419 K

420  $L_{\text{sun}}$

9. Plot the star in question #7 onto your HR diagram. What kind of star (giant, supergiant, etc.) is it? Using the internet reference specified by your instructor, what is the star's spectral type (including luminosity class)?

GIANT

K0III or G1III or  
G3III

(Questions continue on back)

10. Where are on HR diagram (top-left, bottom-right, etc) are stars with the smallest radii plotted?

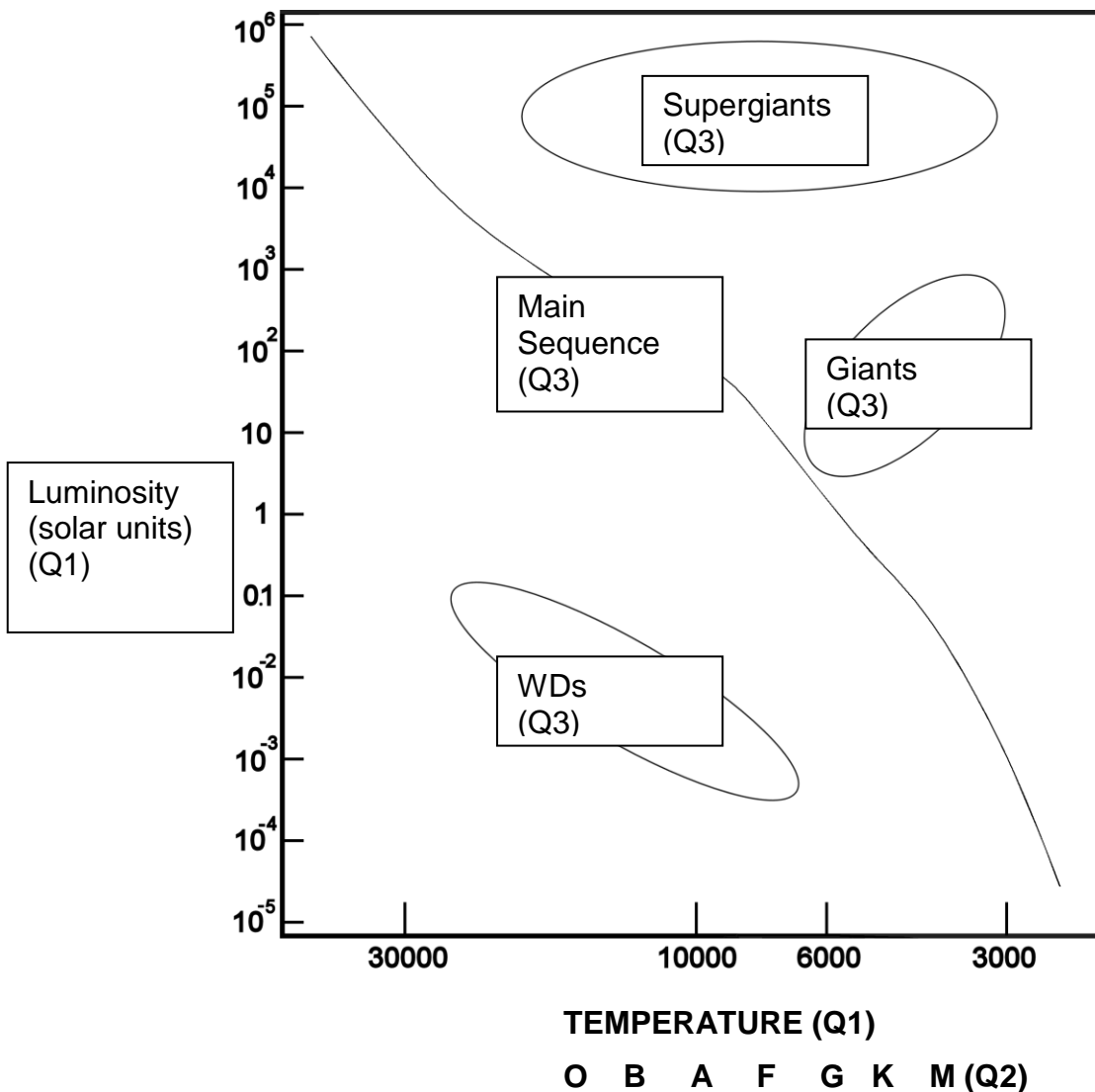
Lower-left

11. Two stars, spectral types M5V and A5V are both in a star cluster, and are therefore about the same distance from us. Which will look brighter to us on the Earth? Which will look redder?

A5V	M5V
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12. Two stars are in the same cluster as question #11. One is spectral type K5V and the other is K5II. Which will look brighter to us?

K5II



**Intro lecture:**

- Cover the basics of an HR diagram, noting the Axes—Luminosity vs. Temperature.
- Spectral sequence OBAFGKM
- Luminosity classes: Main sequence (V), giants (II-IV), supergiants (I), white dwarfs. Mention subclasses.
- Stellar radii on HR diagram
- Remind them that in Starry Nights, double click on stars to get Luminosity and Temperature

**Fill ins and question explanations**

4. Left      Right

5. Supergiant      Giant      Main Sequence

(answers: I, II-IV, V)

6. High Temperature      High Luminosity      Low Temperature      Low Luminosity

7-9. Useful selections. I fully support using Wikipedia.

Star	Temperature (Starry Nights)	Luminosity (Starry Nights)	RA	Dec	SC (Wikipedia)
Capella	5419 K	420 L	5 <sup>h</sup> 17 <sup>m</sup>	46°	K0III
Alkaid	11235 K	212 L	13 <sup>h</sup> 47 <sup>m</sup>	49°	B3V
Phecda	8666 K	89 L	11 <sup>h</sup> 53 <sup>m</sup>	54°	A0V
Arcturus	4106 K	1196 L	14 <sup>h</sup> 15 <sup>m</sup>	19°	K0III

10. Largest      Smallest

11. Any two spectral types, but both are main sequence stars, i.e., O V +G V

12. Two stars of same spectral type (A-M), but different luminosity classes, i.e., K V and K I