

How Is a Star's Color Related to Its Temperature?

Name: _____

(M. Davis) Earth Science II Lab on the Hertzsprung-Russell Diagram

Date: _____

On a clear night you have surely noticed that some stars are brighter than others. But stars also have different colors. Rigel is blue, and Betelgeuse is red. Capella and our sun are yellow. In this activity you will make your own Hertzsprung-Russell diagram. You will see how star brightness, color, temperature, and class are related.

Materials:

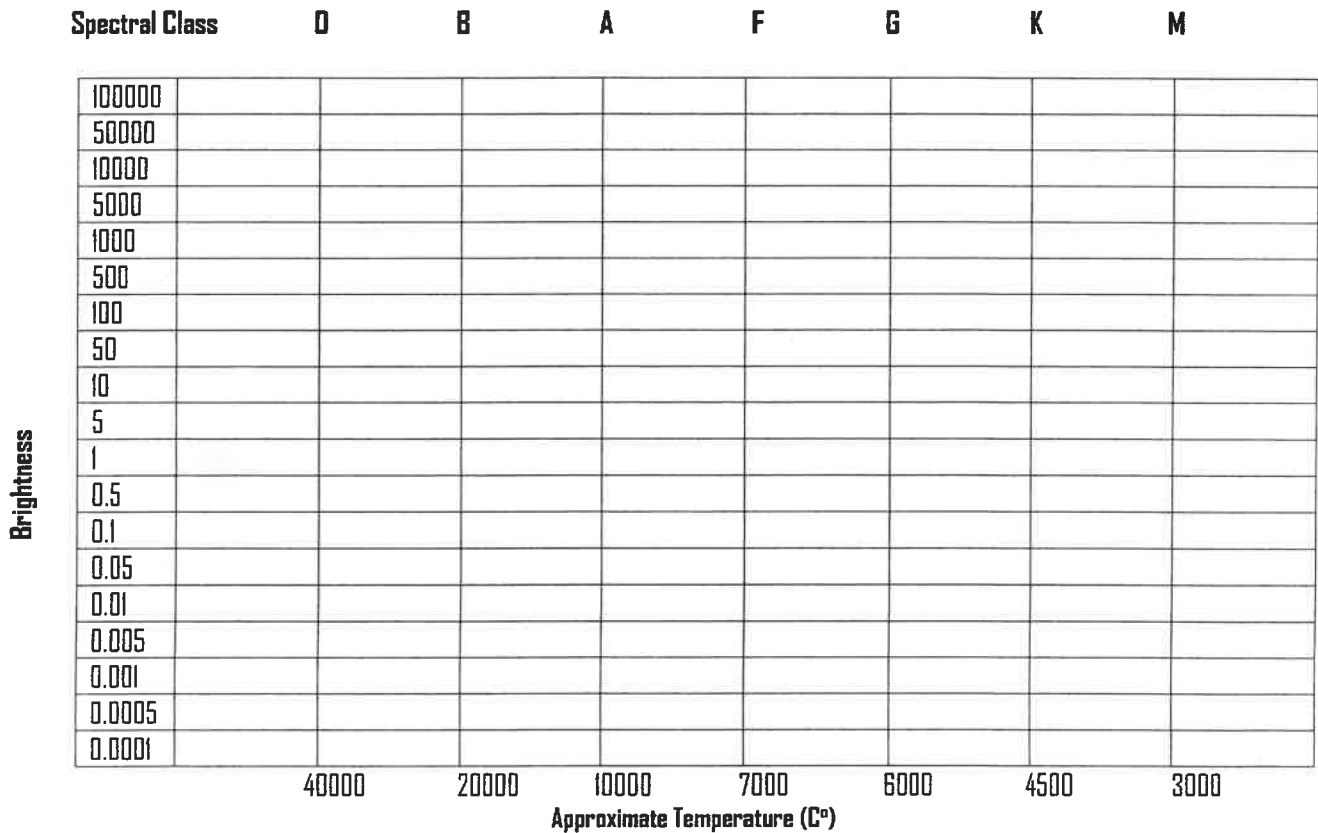
Colored pencils (red, orange, yellow, blue)

Procedure:

1. Study the star data charts below. Note that the sun, used as a standard of brightness, is given a value of 1. The brightness given for each other star shows how that star compares with the sun.
2. Plot the data from both charts on the graph on the next page.
3. Stars with surface temperatures up to 3,500°C are red. Shade a vertical band from 2000°C to 3500°C a light red.
4. Shade other color bands as follows: Stars up to 5000° C are orange-red, up to 6000°C yellow-white, up to 7500°C blue-white, and up to 40,000°C blue.
5. Look for patterns in your graph. Compare it to the following H-R diagram.
6. Label the main sequence, red super giants, and the white dwarf stars.

	Star Name	Temperature (C°)	Brightness (Luminosity) Sun = 1
1	SUN	5300	1
2	ALPHA CENTAURI A	5500	1.3
3	ALPHA CENTAURI B	3900	0.36
4	BARNARD'S STAR	2500	0.0004
5	LALANDE 21185	2900	0.005
6	SIRIUS A	10100	23
7	SIRIUS B	10400	0.008
8	ROSS 248	2400	0.0001
9	61 CYGNI A	3900	0.08
10	61 CYGNI B	3600	0.04
11	PROCYON A	6200	7.6
12	PROCYON B	7100	0.0005
13	EPSILON INDI	3900	0.13
14	CANOPUS	7100	1500
15	ARCTURUS	4200	90
16	VEGA	10400	60
17	CAPELLA	5600	150
18	RIGEL	11500	40000
19	BETELGEUSE	2900	17000
20	ACHERNAR	14000	200
21	BETA CENTAURI	21000	3300
22	ALTAIR	7700	10
23	ALDEBARAN	3900	90
24	SPICA	21000	1900
25	ANTARES	3100	4400
26	DENEK	9900	40000
27	BETA CRUCIS	22000	6000

Hertzsprung-Russell Diagram



Questions

1. What is the general relationship between temperature and star brightness?
2. What relationship do you see between star color and temperature?
3. List the colors from coolest to hottest:
4. How does the sun compare to the other stars on the main sequence?
5. What spectral class does our sun belong to? _____
6. If a star is class B, what is its temperature _____ and color _____?
7. Dwarf stars are smaller than our Sun. How can they be so bright?
8. Circle and label dwarf stars, red giants, blue giants and main sequence stars.