



STUDENT ACTIVITY

Name - _____

Per - _____ Table - _____

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

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 chart 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. Using an X as a plot point, plot the data from the chart on the graph on the next page. Label the Sun plot only.
3. Stars with surface temperatures up to 3,500°C are red. Shade a vertical column from 2,000°C to 3,500°C a light red.
4. Shade other color columns as follows: Stars up to 5,000°C are orange-red; up to 6,000°C yellow-white; up to 7,500°C blue-white, and up to 40,000°C blue.
5. Look for patterns in your graph. Compare it to the H-R diagram supplied by your teacher.
6. Label the main sequence, the red super giants, and the white dwarfs.

Star-Brightness Data

Star Name	Approx. Temp °C	Brightness (Sun = 1)	Star Name	Approx. Temp °C	Brightness (Sun = 1)
Sun	5,300	1	Canopus	7,100	1,500
Alpha Centauri A	5,500	1.3	Arcturus	4,200	90
Alpha Centauri B	3,900	0.36	Vega	10,400	60
Barnard's Star	2,500	0.0004	Capella	5,600	150
Lalande 21185	2,900	0.005	Rigel	11,500	40,000
Sirius A	10,100	23	Betelgeuse	2,900	17,000
Sirius B	10,400	0.008	Achernar	14,000	200
Ross 248	2,400	0.0001	Beta Centauri	21,000	3,300
61 Cygni A	3,900	0.08	Altair	7,700	10
61 Cygni B	3,600	0.04	Aldebaran	3,900	90
Procyon A	5,200	7.5	Spica	21,000	1,900
Procyon B	7,100	0.0005	Antares	3,100	4,400
Epsilon Indi	3,900	0.13	Deneb	9,900	40,000
			Beta Crucis	22,000	6,000

Spectral Class	O	B	A	F	G	K	M
100,000							
50,000							
10,000							
5,000							
1,000							
500							
100							
50							
10							
5							
1							
0.5							
0.1							
0.05							
0.01							
0.005							
0.001							
0.0005							
0.0001							

(Brightness)

40,000 20,000 10,000 7,000 6,000 4,500 3,000

Approximate Temperature, °C

Questions:

1. What is the general relationship between temperature and star brightness?
(Hint: Main Sequence)
2. What relationship do you see between star color and star temperature?
3. How does the sun compare to the other stars on the main sequence?
4. What star class does our sun belong to?
5. A star is classified as being in class B. What is its color? Temperature?
6. We know dwarfs are small—smaller than our sun. How can they be so bright?