Name: ANSWER KEY Pd: ____ Ast: ____

HR Diagram:
How is a Star's Color Related to its Temperature?

BACKGROUND: On a clear night as you look up into the sky, you have surely noticed that some stars appear brighter than others. What many people don't realize is that stars also have different colors. This difference in color has been noted by astronomers and can be observed through modern telescopes. Scientists use a tool called a Herztsprung-Russel Diagram to show relationships using the colors of stars. An HR diagram is named after two astronomers who independently noticed patterns in the color and temperature of stars. It plots stars on a graph based on their temperature and relative brightness. In this activity, you will develop your own HR diagram using data on a small number of known stars to see how star brightness, color, temperature, and spectral class are related.

MATERIALS: Use the data table on the back of this paper to plot each star on the graph. You will use colored pencils (Blue, Light Blue, White (gray), Light Yellow, Yellow, Orange, & Red) to fill in the data on the graph.

PROCEDURE:

1) Study the data table on the back of the paper. Note that the Sun is used as a standard of brightness; it is given a value of 1. The brightness given for all of the other stars shows how that star's brightness compares to the Sun.
2) Plot the data from the chart on the graph on the back of this paper. Use the colored pencil that matches the color listed in the chart. Estimate the location of the temperatures (don't get bogged down in being perfect).
3) Look for patterns in your graph.
4) Answer the questions below.

DATA: Data table can be found on the back side of this paper.

QUESTIONS:

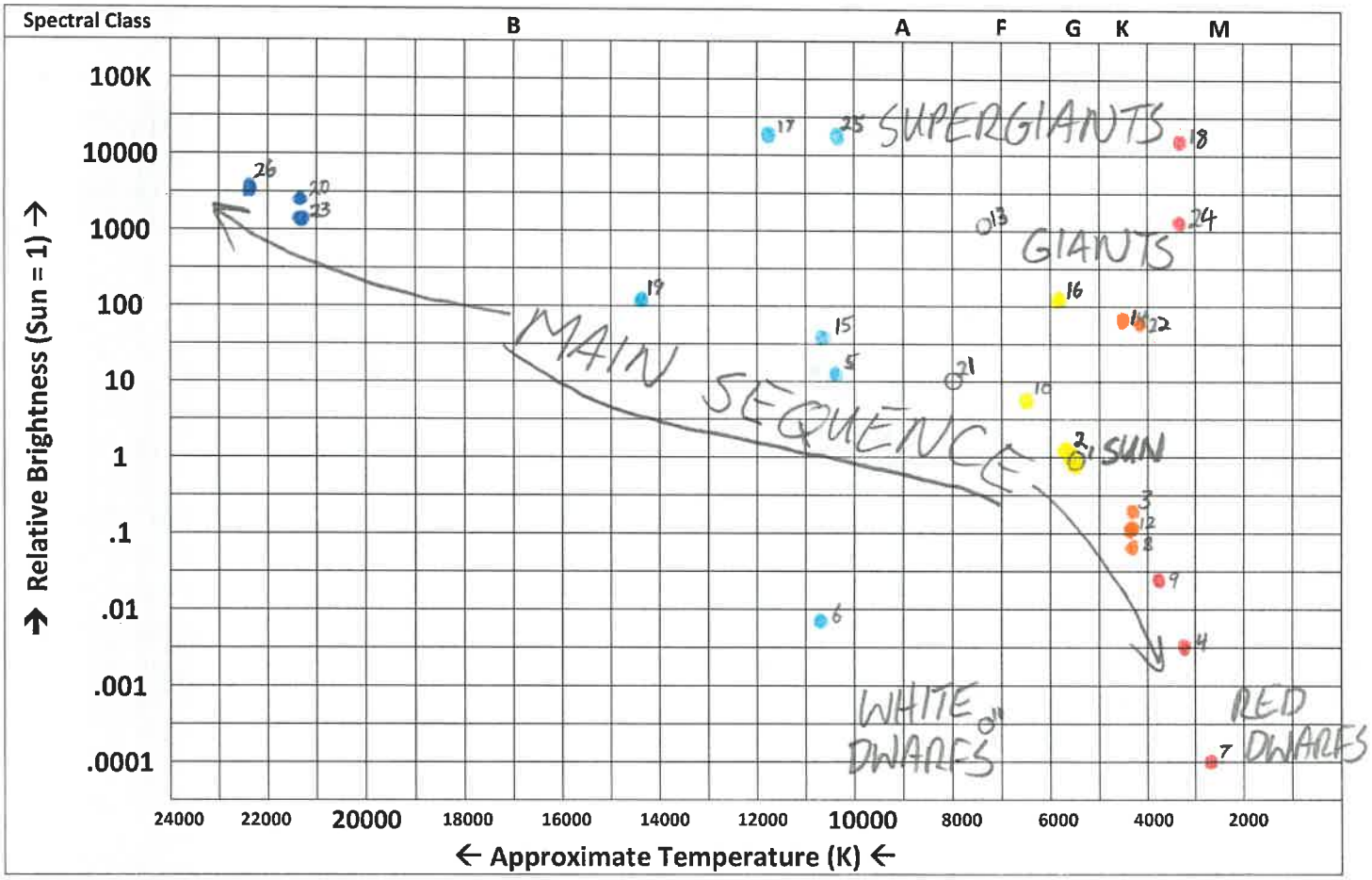
1. What is the general relationship between temperature and star brightness for main sequence stars?
   MAIN SEQUENCE STARS TEND TO GET BRIGHTER AS THEY GET HOTTER.
2. What relationship do you see between star color and temperature in main sequence stars?
   STAR COLOR DEPENDS ON TEMPERATURE, WITH RED BEING THE COOLEST AND BLUE BEING THE HOTTEST STARS.
3. List the star colors from coolest to hottest.
   COOLEST RED - ORANGE - YELLOW - LIGHT YELLOW - WHITE - LIGHT BLUE - BLUE HOTTEST
4. How does the Sun compare to the other stars on the main sequence?
   THE SUN IS AN AVERAGE STAR, WITH MEDIUM TEMPERATURE AND BRIGHTNESS
5. What spectral class does our Sun belong to? CLASS "G" (LISTED AT TOP OF GRAPH)

Refer to the HR diagram on page 97 of your textbook to answer the following questions.

6. Label White Dwarfs, Red Dwarfs, Main-Sequence Stars, Giants, and Supergiants on your diagram. (SEE GRAPH)
7. How do White Dwarf stars compare to our Sun?
   THEY HAVE A SIMILAR TEMPERATURE, BUT ARE MUCH DIMMER THAN OUR SUN
8. How do Supergiants compare to our Sun?
   THEY ARE MUCH BRIGHTER THAN OUR SUN

ANSWER KEY

HERTZSPRUNG-RUSSELL DIAGRAM



#	Star Name	Temperature (K)	Brightness: Sun = 1	Color
1	SUN	5600	1	Yellow
2	ALPHA CENTAURI A	5800	1.3	Yellow
3	ALPHA CENTAURI B	4200	0.36	Orange
4	LALANDE 21185	3200	0.005	Red
5	SIRIUS A	10400	23	Light Blue
6	SIRIUS B	10700	0.008	Light Blue
7	ROSS 248	2700	0.0001	Red
8	61 CYGNI A	4200	0.08	Orange
9	61 CYGNI B	3900	0.04	Red
10	PROCYON A	6500	7.6	Light Yellow
11	PROCYON B	7400	0.0005	White
12	EPSILON INDI	4200	0.13	Orange
13	CANOPUS	7400	1500	White
14	ARCTURUS	4500	90	Orange
15	VEGA	10700	60	Light Blue
16	CAPELLA	5900	150	Light Yellow
17	RIGEL	11800	40000	Light Blue
18	BETELGEUSE	3200	17000	Red
19	ACHERNAR	14300	200	Light Blue
20	BETA CENTAURI	21300	3300	Blue
21	ALTAIR	8000	10	White
22	ALDEBARAN	4200	90	Orange
23	SPICA	21300	1900	Blue
24	ANTARES	3400	4400	Red
25	DENEB	10200	40000	Light Blue
26	BETA CRUCIS	22300	6000	Blue