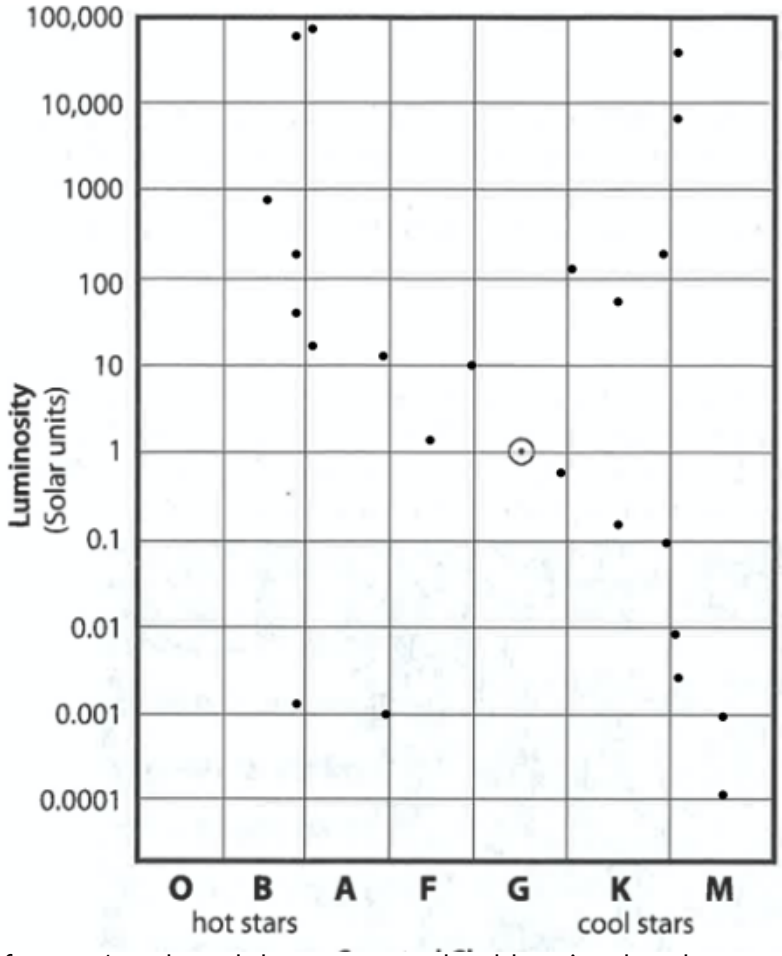
NAME KEY _____

CONSTRUCTING THE H-R DIAGRAM FOR NEARBY STARS /66

Use the data from the chart on the right to plot the star locations on the H-R diagram. "Hot" means put the dot more to the left, and "cool" means put the dot more to the right. For simplicity, keep all dots representing stars the same size. Put the first 2 letters of the star's name next to the dot. For example, Betelgeuse will be labelled "be" and Aldebaran will be labelled "al." The last 8 with no names have been done for you. (16PTS)



Name	Luminosity	Spec Class
Rigel	90,000	cool B
Deneb	95,000	hot A
Betelgeuse	60,000	hot M
Antares	9000	hot M
Aldebaran	200	cool K
Arcturus	110	hot K
Pollux	85	K
Regulus	200	cool B
Vega	80	cool B
Sirius A	30	hot A
Altair	15	cool A
Procyon A	10	cool F
Sun ⊙	1	G
Sirius B	0.003	hot B
Procyon B	0.001	cool A
Barnard's Star	0.001	M
	0.0002	M
	0.009	hot M
	0.1	cool K
	0.005	hot M
	0.3	K
	0.8	cool G
	3	F
	900	B

After you've plotted the stars, you should notice that they don't appear everywhere on the diagram.

LABEL THE FOLLOWING CATEGORIES OF STARS: (6PTS)

- Main Sequence *(Put 1 circle around the stars in the upper left, middle, and lower right.)*
- Blue Giants *(Stars in the upper left.)*
- Red Dwarfs *(Stars in the lower right.)*
- Sun class stars *(Stars in the middle.)*
- Red Giants *(Stars in the upper right.)*
- White Dwarfs *(Stars in the lower center.)*

Based on its location above, what type of star is… (6pts)

Betelgeuse	RED GIANT	Rigel	SUPER GIANT	Procyon A	SUN CLASS
Deneb	SUPER GIANT	Barnard's star	RED DWARF	Procyon B	WHITE DWARF

HR DIAGRAM SIMULATOR

https://astro.unl.edu/naap/hr/animations/hr.html

Go to the above website and play around with the simulator.

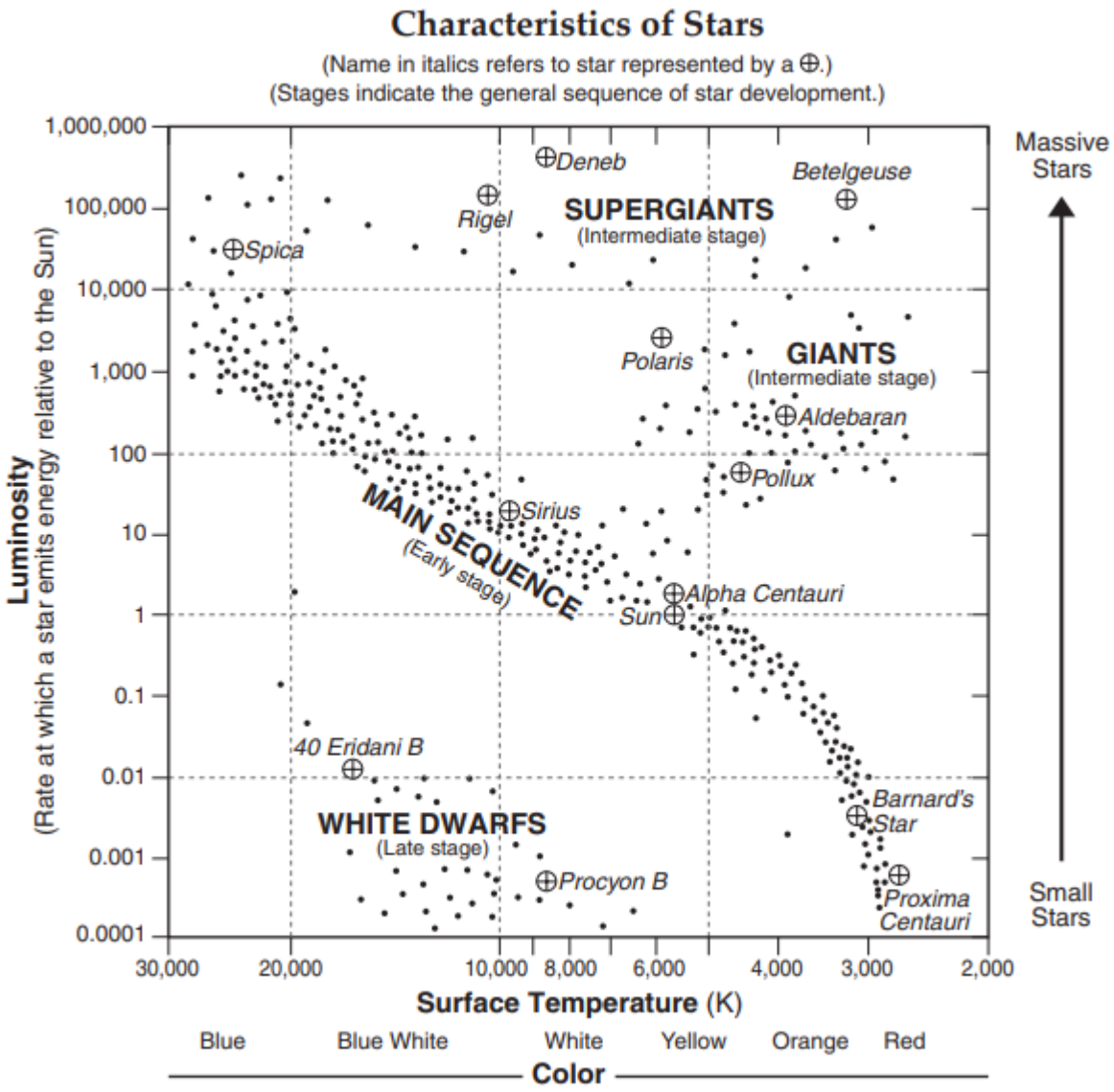
1. What is the temperature of the sun? 5800
2. What is the temperature range? 2300-40,000
3. Where on the HR diagram is the star placed when the temperature is the lowest? FAR RIGHT SIDE
4. Where on the HR diagram is the star placed when the temperature is the highest? FAR LEFT SIDE
5. In general, if you increase the luminosity, what happens to the star in the picture? GETS BIGGER
6. Set the temperature at its lowest, then move luminosity to its highest. What happens to the size of this star compared to the sun?

   MUCH BIGGER
7. Set temperature to 3900 and luminosity to 610. What luminosity class is this star? (click luminosity classes on the right side) RED GIANT
8. Set temperature to 13,000 and luminosity to .0028. What luminosity class is this star? (click luminosity classes on the right side) WHITE DWARF
9. Set temperature to 30,000 and luminosity to 250,000. What luminosity class is this star? (click luminosity classes on the right side) BLUE GIANT
10. Make the sun the same size as the star (the left circle) by moving the red x on the graph. Where (in general) is the x located? MIDDLE OF GRAPH
11. Put the x in the top left section of the green strip (make sure luminosity classes is selected). Drag the red x along the green strip (the main sequence) diagonally down to the right. What 2 ways does the star change as you do this? GETS SMALLER --AND-- MOVES FROM BLUE TO ORANGE (RED)

Toggle the y-axis scale button from "luminosity" to "magnitude"

12. What is the absolute magnitude of a blue giant? -7, -8, -9, -10
13. What is the luminosity of a blue giant? 10 TO 5TH POWER TO 10 TO 6TH POWER
14. How are the numbers different when showing luminosity versus absolute magnitude?

    LUMINOSITY = POSITIVE NUMBERS ABSOLUTE MAGNITUDE= NEGATIVE NUMBERS



USE THE DIAGRAM ABOVE TO ANSWER THE NEXT 17 QUESTIONS

15. Look at the X axis above. How is it different from the X axis of the graph on page 1?

THIS GRAPH SHOWS TEMPERATURE AND COLORS/ OTHER SHOWS SPECRAL CLASSES

16. What temperature is Barnard's star? ~3000 DEGREES K What color? RED

17. How is the Sun, Alpha Centauri, and Polaris similar?

ALL ~600 DEGREES K

18. According to this chart, what color of star is the hottest? BLUE

19. How is luminosity defined on this chart?

RATE AT WHICH A STAR EMITS ENERGY RELATIVE TO THE SUN

20. How long will Spica live? MILLIONS OF YEARS

21. Which star is more likely to become a supernova, Deneb or Betelgeuse? DENEB

22. What type of star did Betelgeuse used to be? YELLOW/ SUN CLASS

23. Proxima Centauri and Alpha Centauri are part of a triple star system that is the nearest to the sun. Why are they so far apart on this chart? CHART DOESN'T SHOW DISTANCES/ CHART SHOWS BRIGHTNESS AND TEMPS

24. Which of the 2 is bigger? ALPHA CENTAURI

25. Is Procyon B living or dying? DYING

26. Who is bigger, Rigel or Sirius? RIGEL

27. Who is brighter Spica or Rigel? RIGEL

28. What kind of star did Rigel used to be? BLUE GIANT

29. Who is brighter, the Sun or Eridani B? SUN

30. Who is hotter, the Sun or Eridani B? ERIDANI B

31. Which of the 2 is dying? ERIDANI B

32. What does Procyon B turn into when it finally fuses all its fuel? BLACK DWARF

33. Rigel and Deneb will probably explode into SUPERNOVAE

34. What type of star forms in the center of a supernova (super dense!) NEUTRON STAR

35. How is the death of a sun class star different from the death of a red dwarf?
SUN--> RED GIANT--> WHITE DWARF RED DWARF-->WHITE DWARF-->BLACK DWARF

36. How long will Proxima Centauri live? 100'S OF BILLIONS OF YEARS

37. How long will Alpha Centauri live? BILLIONS OF YEARS