

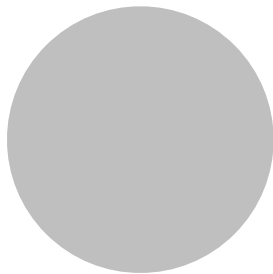
Star Properties and the Hertzsprung-Russell Diagram

YOUR MISSION: Compare brightness, mass, color, and size of some of the nearest and brightest stars to figure out:

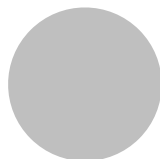
- What properties determine how bright a star is?
- What kinds of stars are most common?

Use these two tools to help you with the graphs in Stage 1 and 2

THE SPECTRAL SEQUENCE			
Class	Spectrum	Color	Temperature
O	ionized and neutral helium, weakened hydrogen	bluish	31,500-49,000 K
B	neutral helium, stronger hydrogen	blue-white	10,000-31,500 K
A	strong hydrogen, ionized metals	white	7500-10,000 K
F	weaker hydrogen, ionized metals	yellowish white	6000-7500 K
G	still weaker hydrogen, ionized and neutral metals	yellowish	5300-6000 K
K	weak hydrogen, neutral metals	orange	3800-5300 K
M	little or no hydrogen, neutral metals, molecules	reddish	2100-3800 K



Radius > 300x as big as the sun



Radius > 100x as big as the sun



Radius > 10x as big as the sun



Radius > 2x as big as the sun



Radius like the sun



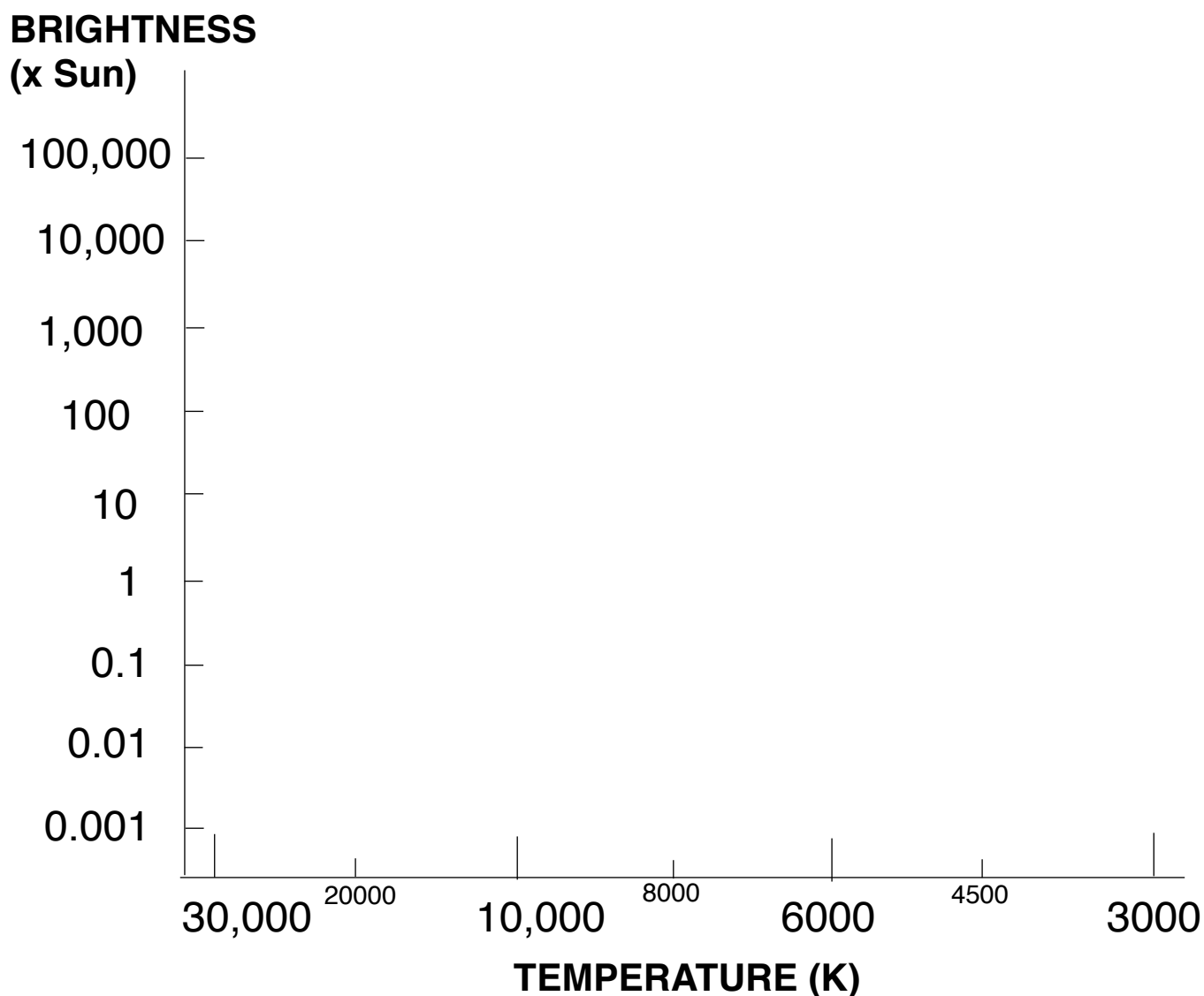
Crazy small

The 25 Brightest stars in the Sky

	NAME	TEMPERATURE (K)	BRIGHTNESS (x Sun)	RADIUS (x Sun)	MASS (x Sun)
1	Sun	5800	1	1	1
2	Sirius	9900	25	1.7	2
3	Canopus	7400	12000	71	10
4	Alpha Centauri	5800	1.5	1.2	1.1
5	Arcturus	4300	170	26	1.1
6	Vega	9600	50	2.8	2.1
7	Capella	4900	79	12	2.7
8	Rigel	11000	80000	80	20
9	Procyon	6500	7	2	1.5
10	Achernar	15000	3000	11	7
11	Betelgeuse	3500	140000	1180	8
12	Hadar	25000	41000	8	11
13	Acrux	28000	25000	4	10
14	Altair	7700	11	1.8	1.8
15	Aldebaran	3900	500	44	1.7
16	Antares	3400	58000	880	12
17	Spica	22000	12000	7	10
18	Pollux	4900	43	8	2
19	Fomalhaut	8750	18	2	2
20	Becrux	27000	34000	8	16
21	Deneb	8500	200000	200	19
22	Regulus	10000	290	3	4
23	Adhara	22000	39000	14	12
24	Castor	10000	30	2.3	2.2
25	Gacrux	3600	1500	84	1.3

STAGE 1: Graph the 25 brightest stars on this diagram. Use colors that correspond to their temperature, and draw circles that roughly match their sizes relative to the sun.

Hertzprung-Russell Diagram of the 25 **brightest** stars

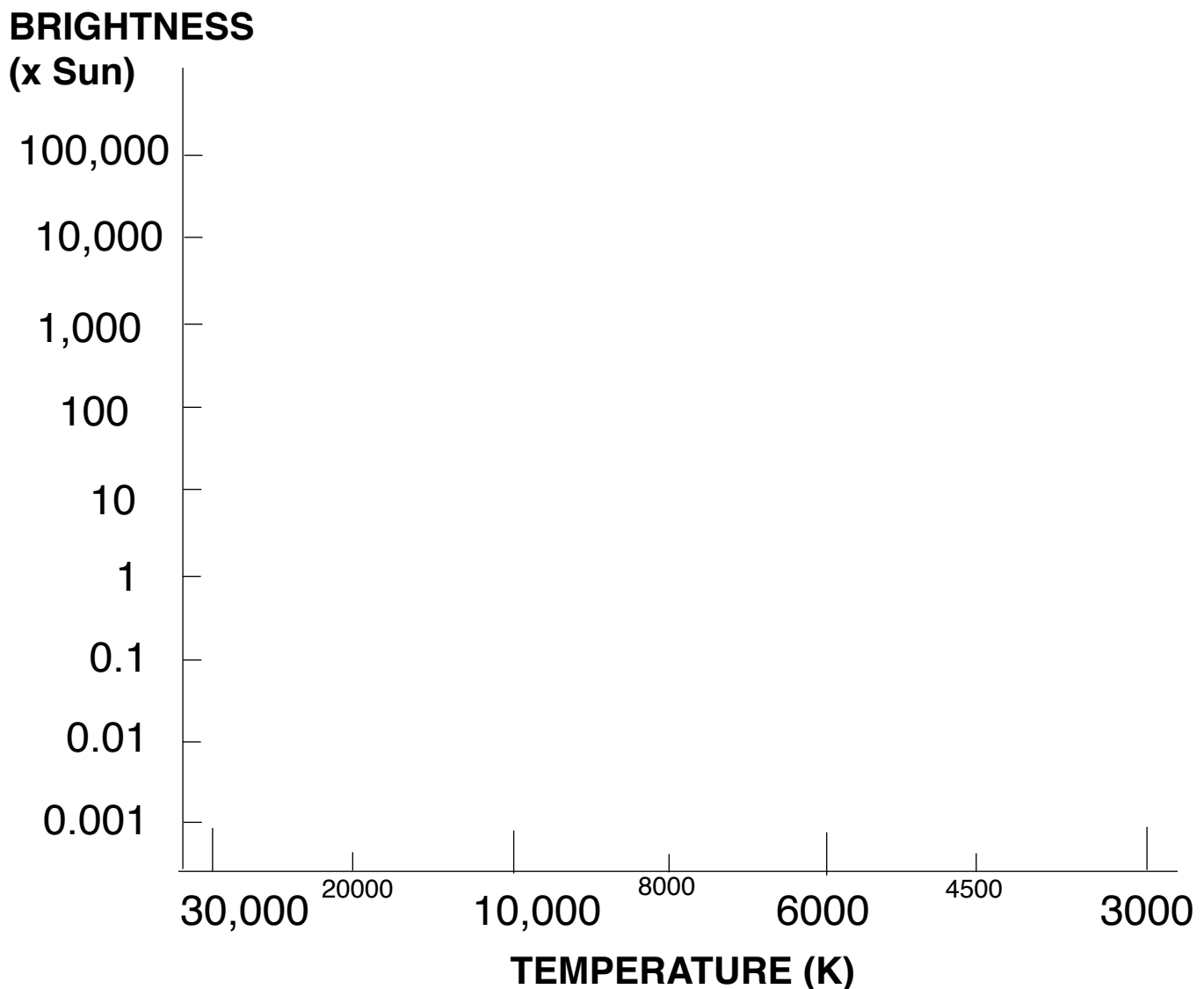


The 25 Nearest stars to the Sun

	NAME	TEMPERATURE (K)	BRIGHTNESS (x Sun)	RADIUS (x Sun)	MASS (x Sun)
1	Sun	5800	1	1	1
2	Proxima Centauri	3000	0.001	0.15	0.1
3	Alpha Centauri A	5800	1.5	1.2	1.1
4	Alpha Centauri B	5200	0.5	0.9	0.9
5	Barnard's Star	3100	0.004	0.2	0.1
6	Wolf 359	2800	0.001	0.15	0.1
7	Lalande 21185	3800	0.02	0.4	0.5
8	Sirius A	9900	25	1.7	2
9	Sirius B	25200	0.06	0.01	1
10	Luyten 726-8	2700	0.0001	0.15	0.1
11	Ross 154	3300	0.004	0.24	0.2
12	Ross 248	2800	0.002	0.16	0.1
13	Epsilon Eridani	5100	0.3	0.75	0.8
14	Lacaille 9352	3600	0.03	0.45	0.5
15	Ross 128	3200	0.004	0.21	0.15
16	EZ Aquarii	2700	0.001	0.1	0.1
17	Procyon A	6500	7	2	1.5
18	Procyon B	7700	0.0005	0.01	0.6
19	61 Cygni A	4500	0.08	0.6	0.63
20	Struve 2398 A	3400	0.04	0.35	0.3
21	Groombridge 34	3700	0.03	0.38	0.4
22	Epsilon Indi	4600	0.2	0.73	0.8
23	DX Cancri	2800	0.0007	0.11	0.1
24	Tau Ceti	5300	0.5	0.8	0.8
25	Gliese 1061	2800	0.001	0.1	0.1

STAGE 2: Graph the 25 nearest stars on this diagram. Use colors that correspond to their temperature, and draw circles that roughly match their sizes relative to the sun.

Hertzprung-Russell Diagram of the 25 nearest stars



STAGE 3: Examine these two graphs.

What are differences between the Hertzsprung-Russell (HR) diagram of the 25 nearest stars, and the 25 brightest stars?

What kind of stars show up on the HR diagram of the nearest stars that don't show up on the HR diagram of the brightest stars?

What kind of stars show up on the HR diagram of the brightest stars that don't show up on the HR diagram of the nearest stars?

Are there any stars that show up on both lists?

Based on comparing these two diagrams, which type of stars are the most common?

What are the properties (mass, luminosity, radius, and mass) of the most common stars?