

How Old are They??

Directions: Rank each of the following pictures by age, going from youngest to oldest. Put a 1 in the blank by the picture you think is the youngest person, a 2 in the blank by the second youngest person, and so on. If you wish, try guess the age of each person.



A) _____



B) _____



C) _____



D) _____



E) _____



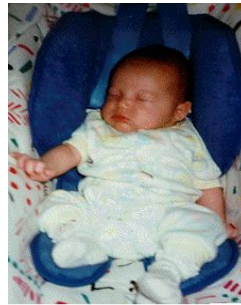
F) _____



G) _____



H) _____



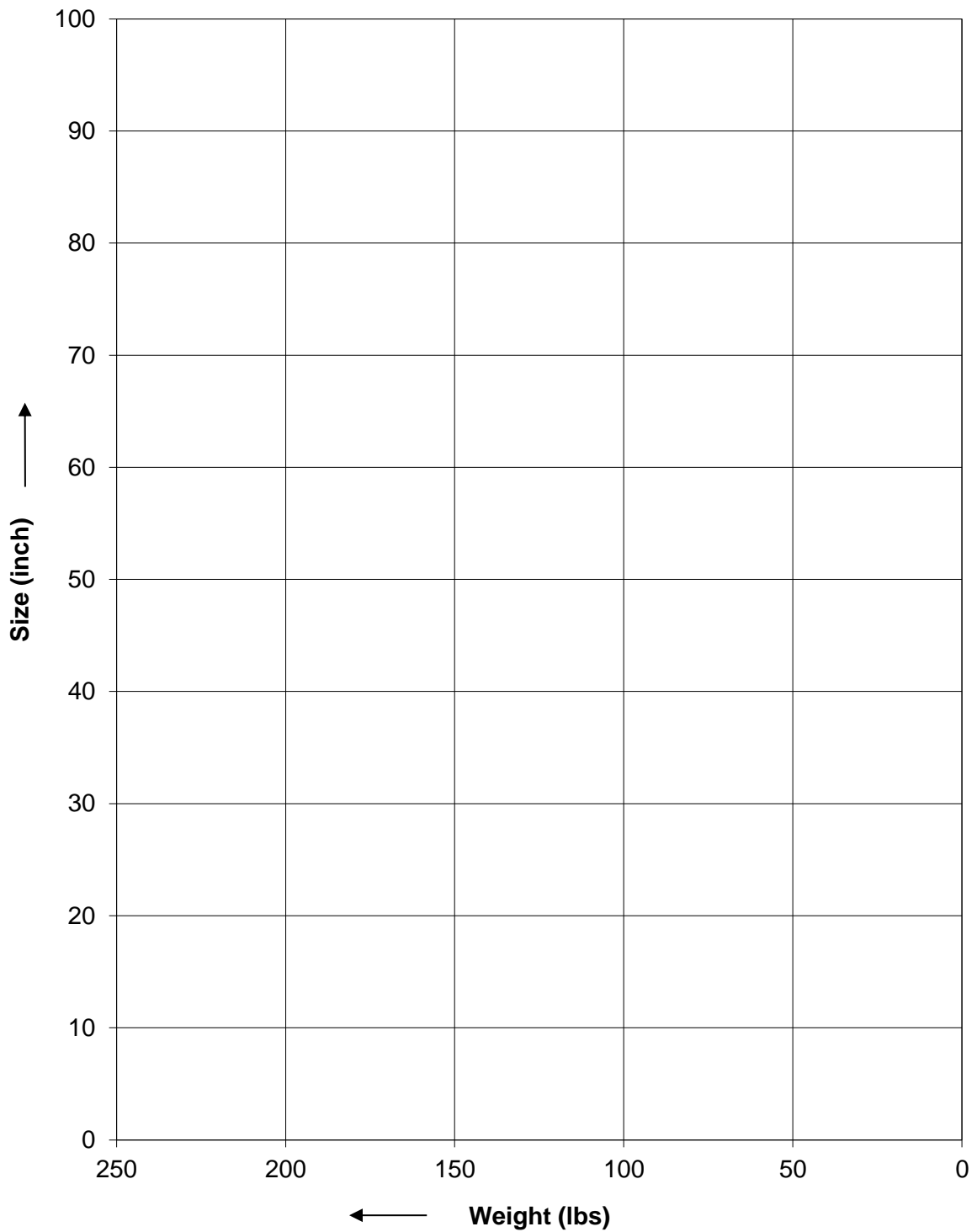
I) _____

From: NASA/MSU-Bozeman CERES Project

Answer Sheet

- 1. I Age: 1 month old**
- 2. D Age: 5 months old**
- 3. F Age: 3 years old**
- 4. H Age 9 years old**
- 5. E Age 14 years old**
- 6. G Age 30 years old**
- 7. A Age 40 years old**
- 8. B Age 51 years old**
- 9. C Age 90 years old**

Human Size vs. Weight Diagram



Properties of Stars

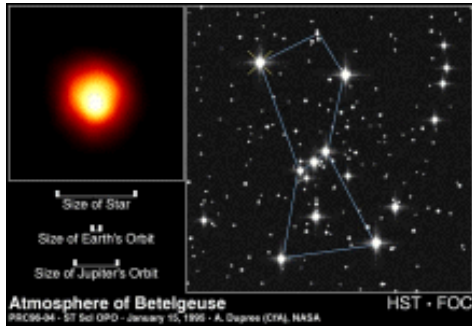
Instructions: Look at this picture of stars.

- 1) List the properties of stars you can measure from this picture?
- 2) What instruments do you need to make such measurements?

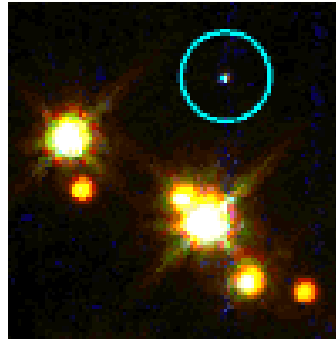


How Old are They??

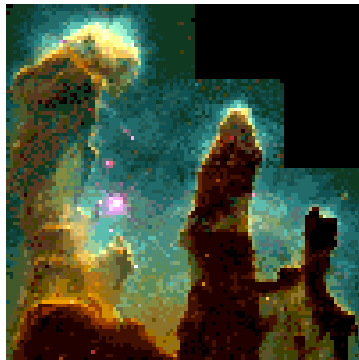
Directions: Rank each of the following pictures by age, going from youngest to oldest. Put a 1 in the blank by the picture you think is the youngest star, a 2 in the blank by the second youngest star, and so on. If you wish, try to guess the age of each star.



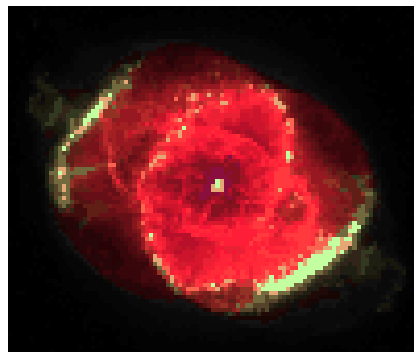
A) _____



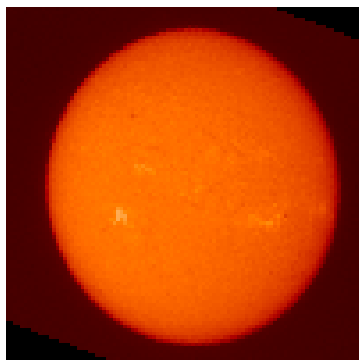
B) _____



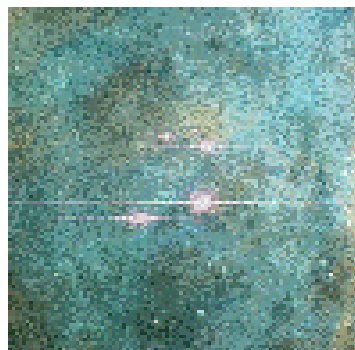
C) _____



D) _____



E) _____



F) _____

Answer Sheet

- 1. F Interstellar Clouds (Nebula)**
- Stars not born yet
- 2. C Star Birth**
- Few million years old
- 3. E Sun (Main Sequence Star)**
- 5 billion years old
- 4. A Red Giant**
- 10 billion years old
- 5. D Planetary Nebula**
- Almost 11 billion years old
- 6. B White Dwarf**
- 12 billion years old

Construct a Hertzsprung-Russell Diagram

Student Instructions

- 1) Identify which stars have been assigned to you to graph.
- 2) Read each star's size from the star list and keep in mind you will make it that many millimeters in diameter on your graph.
- 3) Read the star's color from the star table and plot it with the appropriate size (in mm!) in this color *using its brightness and temperature from the star list to determine where it should be plotted.*

*Follow this procedure for all assigned stars.
This is called a Hertzsprung-Russell Diagram.*

Follow-Up Questions

(Answer on the back of your H-R diagram.)

- 1) Is there a relationship between color and temperature? If so, what is it?
- 2) Is there a relationship between color and size? If so, what is it?
- 3) Is there a relationship between brightness and size? If so, what is it?
- 4) Compare the Hertzsprung-Russell Diagram to the Human Height vs. Weight Diagram we discussed and list at least 2 similarities and differences between the two.
- 5) Can you define an area where most stars are situated? (Hint: Look for a "sliding board.") Astronomers call this area the Main Sequence. Describe the gradual change in the nature of the stars as you "slide" through this area.
- 6) What do you think the main sequence represents?

Hertzprung-Russell Diagram

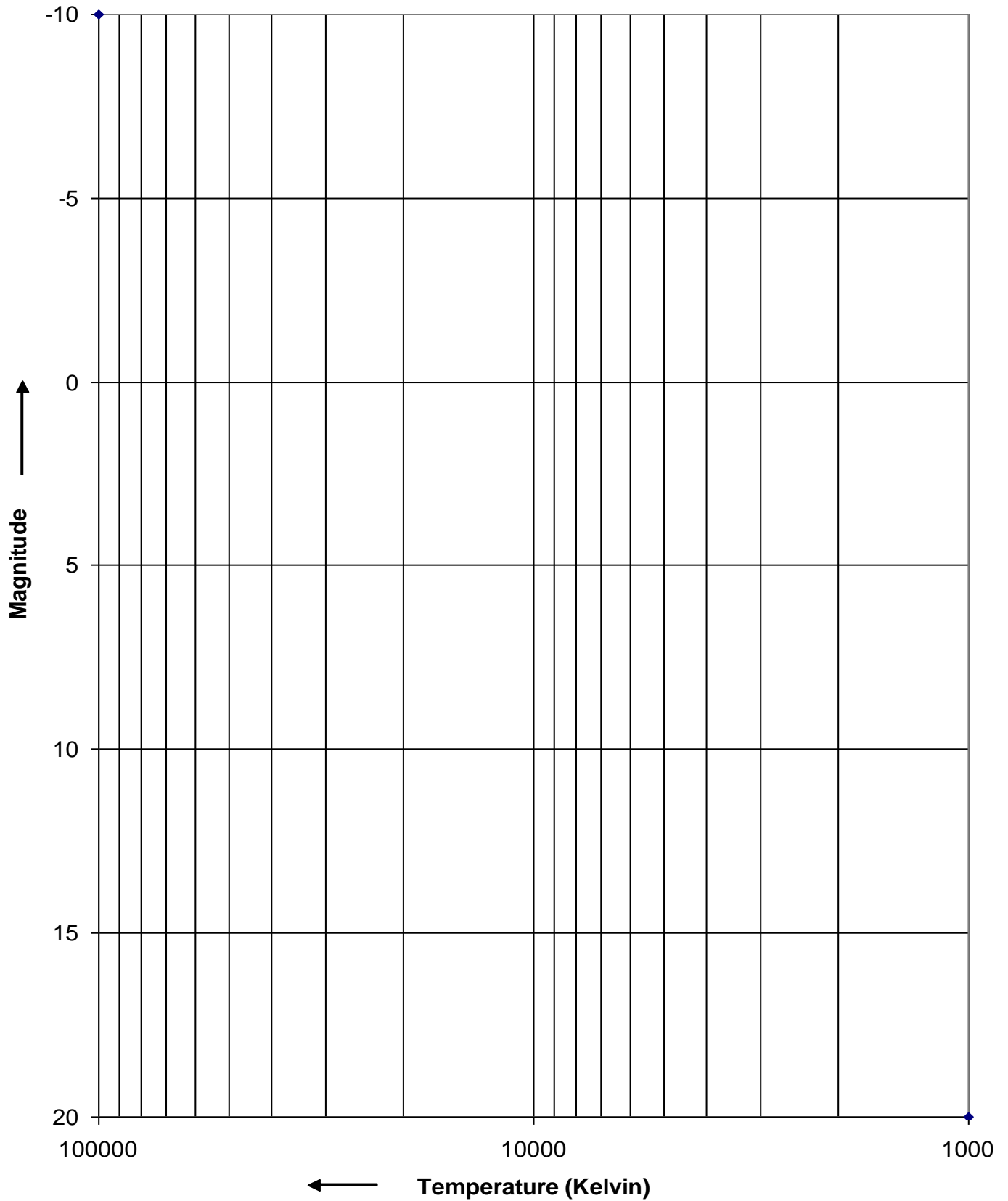


Table 1. Local Stars and their Properties

<u>No.</u>	<u>Name</u>	<u>Temperature</u>	<u>Magnitude</u>	<u>Color</u>	<u>Size</u>
1	40 Eridani A	4900	6.0	orange	3
2	40 Eridani B	10000	11.1	green	1
3	40 Eridani C	2940	12.7	red	2
4	61 Cygni A	4130	7.5	orange	3
5	61 Cygni B	3870	8.3	red	3
6	70 Ophiuchi A	4950	5.7	orange	3
7	70 Ophiuchi B	3870	7.5	red	3
8	89 Her	7000	-4.3	yellow	5
9	Abell 39	85000	-0.3	blue	2
10	Achemar	20500	-2.4	blue	3
11	Acrux	28000	-4.0	blue	3
12	AD Leonis	2940	11.0	red	2
13	Adhara	23000	-5.2	blue	4
14	Al Na'ir	15550	-1.1	blue	3
15	Aldebaran	4130	-0.8	orange	4
16	Alhena	9900	0.0	green	3
17	Alkaid	20500	-1.7	blue	3
18	Alnilam	26950	-6.2	blue	4
19	Alnitak	33600	-5.9	blue	4
20	Alpha Centauri A	5840	4.3	yellow	3
21	Alpha Centauri B	4900	5.8	orange	3
22	Alpha Crucis B	20500	-3.3	blue	4
23	Altair	8060	2.2	green	3
24	Antares	3340	-5.2	red	5
25	Arcturus	4590	-0.4	orange	4
26	Atria	4590	-0.1	orange	4
27	Avior	4900	-2.1	orange	5
28	Barnard's Star	2800	13.2	red	2
29	Bellatrix	23000	-4.3	blue	4
30	Beta Centauri	25500	-5.1	blue	4

Table 1. Local Stars and their Properties - Continued

<u>No.</u>	<u>Name</u>	<u>Temperature</u>	<u>Magnitude</u>	<u>Color</u>	<u>Size</u>
31	Beta Crucis	28000	-4.7	blue	4
32	Betelgeuse	3200	-7.2	red	6
33	Canopus	7400	-3.2	yellow	4
34	Capella	5150	-0.7	orange	4
35	Castor	9620	1.2	green	3
36	Cat's Eye Nebula	47000	-4.0	blue	3
37	Delta Canis Majoris	6100	-8.0	yellow	6
38	Delta Vulpeculae	9900	0.6	green	3
39	Deneb	9340	-7.2	green	5
40	Dubhe	4900	0.2	orange	4
41	Elnath	12400	-1.6	green	4
42	Epsilon Eridani	4590	6.1	orange	3
43	Epsilon Indi	4130	7.0	orange	3
44	EV Lacertae	2800	11.7	red	2
45	Fomalhaut	9060	1.9	green	3
46	G51-I5	2500	17.0	red	1
47	Gacrux	3750	-0.5	red	4
48	GQ Andromedae	2670	13.3	red	2
49	GX Andromedae	3340	10.4	red	2
50	Hadar	25500	-5.3	blue	4
51	Helix Nebula	90000	-0.3	blue	2
52	IRC10216	2500	-5.5	red	6
53	Kapteyn's Star	3480	10.8	red	2
54	Kaus Australis	11000	-0.3	green	3
55	L 789-6	2670	14.5	red	2
56	Lacaille 8760	3340	8.7	red	3
57	Lacaille 9352	3340	9.5	red	3
58	Menkalinan	9340	0.6	green	3
59	Miaplacidus	9300	-0.6	green	4
60	Mira	3000	-4.3	red	5

Table 1. Local Stars and their Properties - Continued

<u>No.</u>	<u>Name</u>	<u>Temperature</u>	<u>Magnitude</u>	<u>Color</u>	<u>Size</u>
61	Mirfak	7700	-4.6	yellow	5
62	NGC7662	100000	-5.0	blue	2
63	OH26.5+0.6	2500	-4.5	red	6
64	Owl Nebula	100000	-1.0	blue	2
65	Peacock	20500	-2.3	blue	3
66	Polaris	6100	-4.6	yellow	5
67	Pollux	4900	0.9	orange	4
68	Procyon A	6600	2.5	yellow	3
69	Procyon B	9700	13.0	green	1
70	Proxima Centauri	2670	15.4	red	2
71	Regulus	13260	-0.8	green	3
72	Rigel	12140	-7.2	green	5
73	Ross 128	2800	13.4	red	2
74	Ross 248	2670	14.7	red	2
75	RV Tau	5500	-5.5	orange	5
76	Sirius A	9620	1.4	green	3
77	Sirius B	14800	11.2	green	1
78	Spica	25500	-3.4	blue	3
79	Struve 2398 A	3070	11.1	red	2
80	Struve 2398 B	2940	11.9	red	2
81	Sun	5840	4.7	yellow	3
82	Tau Ceti	5150	5.7	orange	3
83	Theta Scorpii	7400	-5.6	yellow	5
84	TZ Arietis	2800	14.0	red	2
85	UV Ceti (B)	2670	15.9	red	1
86	van Maanen's Star	13000	14.2	green	1
87	Vega	9900	0.4	green	3
88	Wolf 359 (CN Leo)	2670	16.6	red	1
89	Wolf 424 A	2670	14.9	red	2
90	YZ Ceti	2670	14.1	red	2