

Stars Are Not Drawn To Scale

Part 1: Life Cycles of Stars

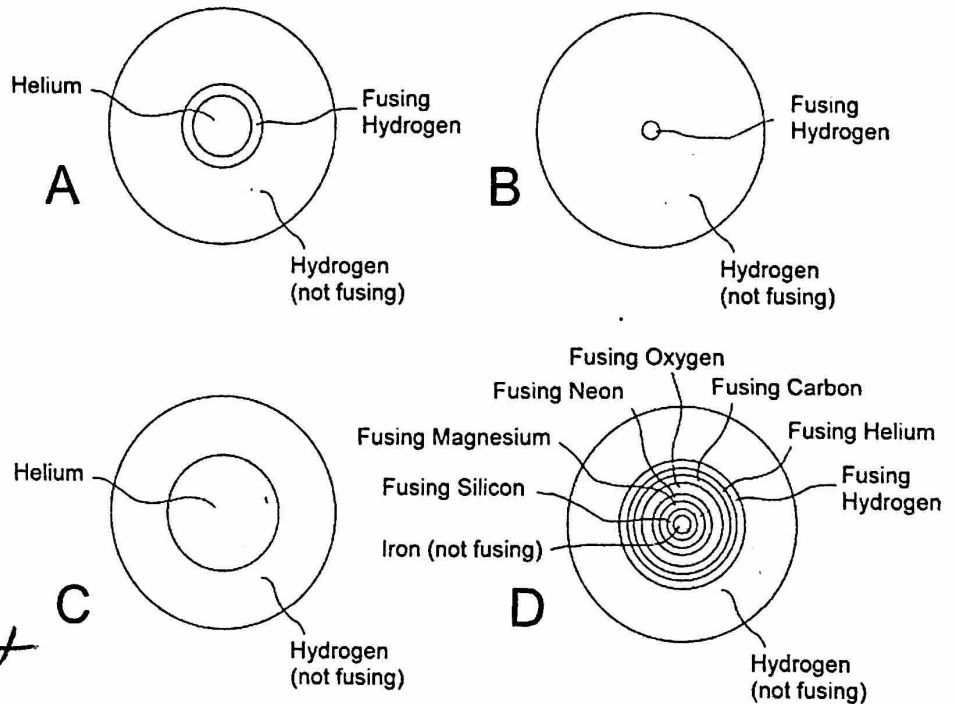
1. Identify each of the stars on the right. Be as specific as you can be.

A. Red Giant

B. Main Sequence Star

C. White Dwarf

D. Red Supergiant



2. Number the life stages of a massive star (20 times more mass than our Sun). Beware, the word bank on the right includes some extra stages that should not be used.

3. A supernova is similar to the formation of a white dwarf, but it is also different.

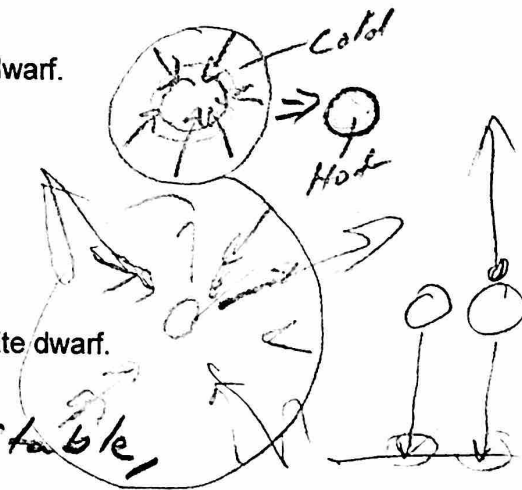
- | | |
|---|------------------------------|
| 6 | • Neutron star or Black hole |
| | • White Dwarf |
| 2 | • Protostar |
| 3 | • Main Sequence Star |
| 5 | • <u>Supernova</u> |
| | • Red Giant |
| 4 | • Red Supergiant |
| | • Black Dwarf |
| 1 | • <u>Nebula</u> |

a. Explain how a supernova is similar to the formation of a white dwarf.

They both happen when a giant star cools and shrinks.

b. Explain how a supernova is different from the formation of a white dwarf.

A white dwarf shrinks, ~~and~~ compresses, and remains stable, but a supernova shrinks with so much speed that it "bounces back" and explodes.



4. What determines whether a dead star will turn into a Black hole or a neutron star?

After the supernova, if the mass left is...
- less than 3X Sun's mass \rightarrow neutron star
- 3X Sun's mass or more \rightarrow black hole

5. List one of the "interesting facts" about Neutron stars.

- ~~1~~ teaspoonful = 900 great pyramids
- Fastest one spins 700 times per second.

Part 2: The origins of matter:

6. Atoms of Gold, lead, mercury, and Uranium are all heavier than iron. None of these substances were created by the Big Bang. What created them?

A Supernova

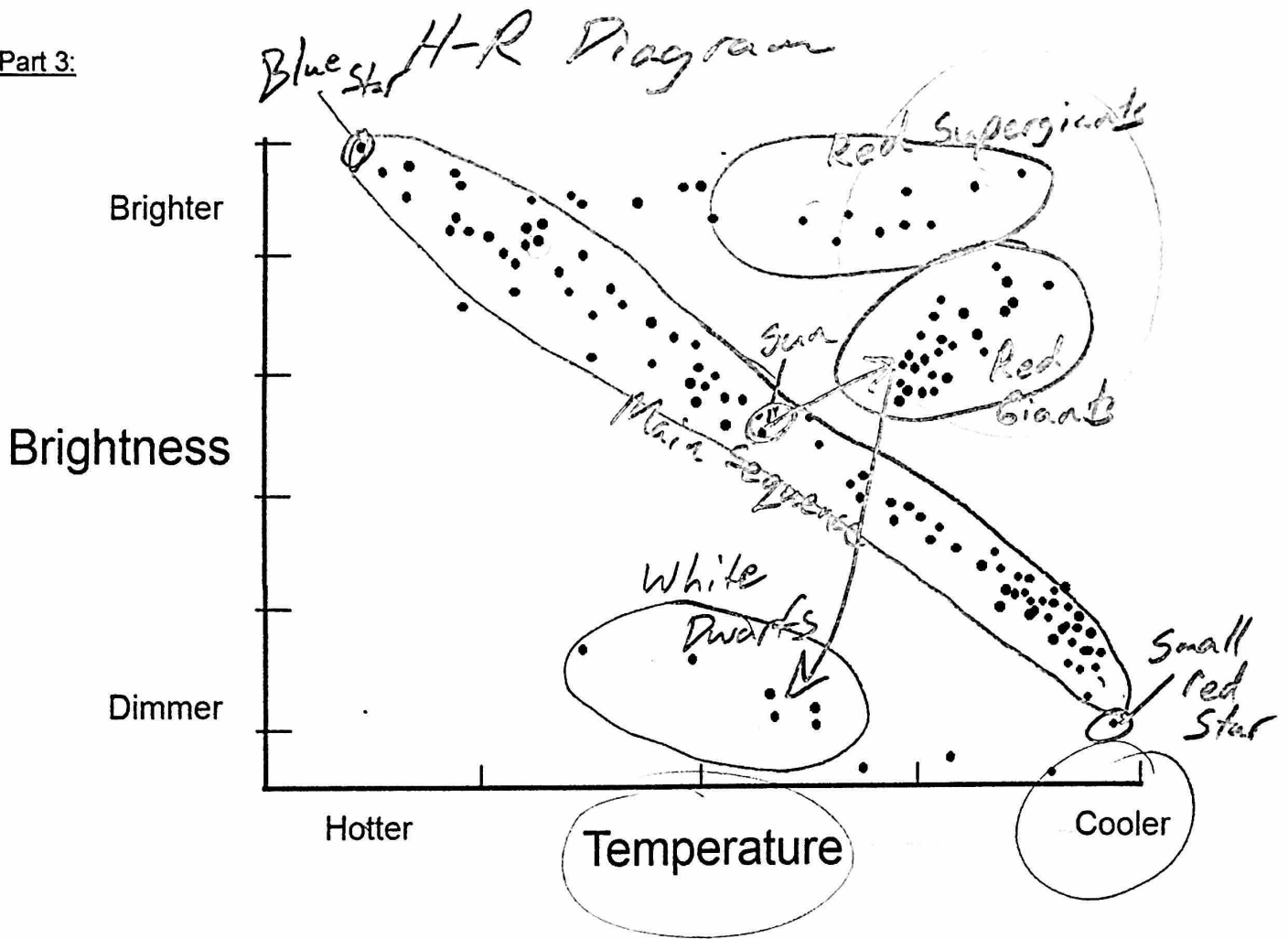
7*. [I forgot to put this in the notes, but I bet you can guess the answer.] Stars are made mostly of hydrogen. Where did the hydrogen come from?

The Big Bang

8. What created the elements that are heavier than hydrogen and helium, but lighter than iron?

Fusion in very massive
Stars (Red Super giants)

Part 3:



9. What is the name for this kind of diagram. Label the diagram with its name.

Show/label all of the following on the diagram above.

- | | | |
|---|------------------------------|------------------------|
| 10. <u>Red giants</u> | 11. White dwarfs | 12. The Main Sequence |
| 13. Our Sun. | 14. A <u>small, red</u> star | 15. A <u>blue</u> star |
| 16. Our Sun's future path as it changes its position in the diagram (use a labeled arrow) | | |

Part 4: Evidence for The Big Bang theory

Two major claims of the Big Bang theory are that...

- ① The Universe began as a hot, dense point of matter, and
- ② The Universe has continued to expand since it first formed.

17. What does CMBR stand for, and what is it?

Cosmic Microwave Background Radiation
 Microwave waves that fill all of the Universe

18. Explain how the CMBR is evidence for the Big Bang theory?

These microwaves are heat that is left over from the Big Bang.

19. Draw a diagram that shows how two observers of the same moving star can see different Doppler shifts – one observer seeing a red-shift, and the other seeing a blue-shift.

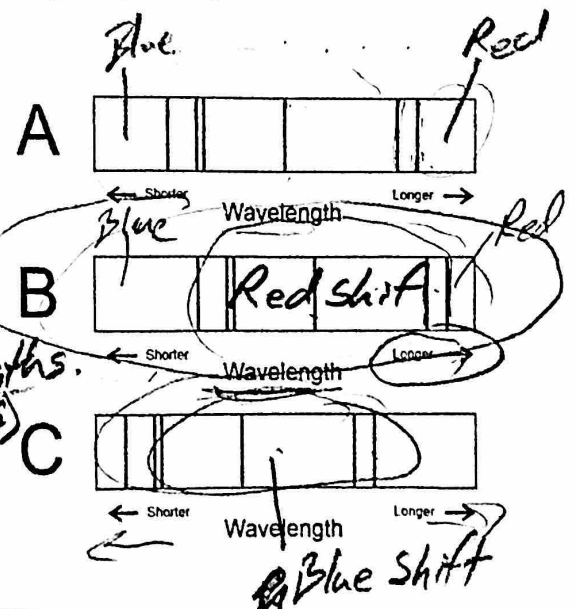


20. Describe Edwin Hubble's discovery (Hubble's Law).

All distant galaxies have red-shifts, so they are moving away.

21. How did Edwin Hubble's discovery provide evidence for the Big Bang theory?

If all galaxies are moving away, the Universe is expanding.



22. The diagram on the right shows the same group of spectral lines from three different stars that were observed from the Earth. Which star is moving away from the Earth? How can you tell?

B. Spectral lines are shifted to longer wavelengths. (redshift)

23. ~~How~~ When did the Big Bang occur?

13.8 Billion Years ago