ESS 100 (Stapleton) Name: _____

Practice Quiz: Life Cycles of Very Massive Stars

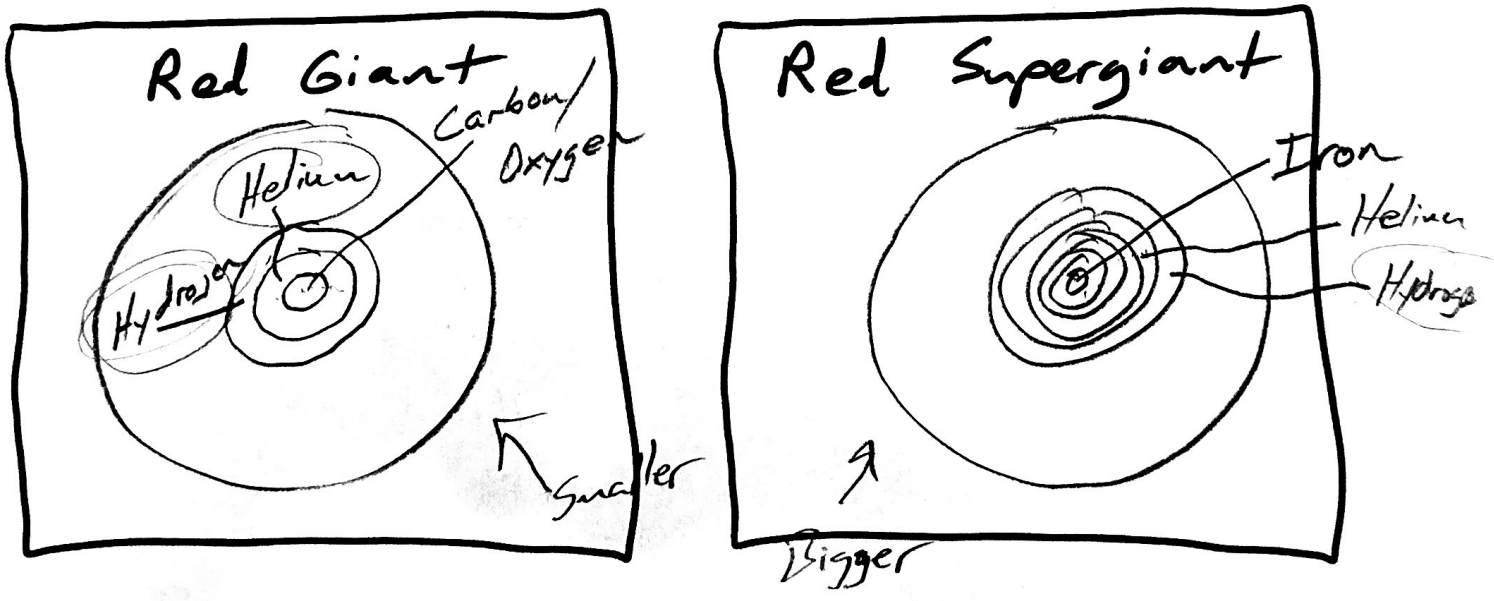
1. Which of these stars would fit the description of "very massive," according to the notes? **Circle all that apply.**

   a. ½ as massive as the Sun.
   b. The same mass as the Sun
   c. Twice as massive as the Sun
   d. 10x the mass of the Sun
   e. 20x the mass of the Sun
   f. 100x the mass of the Sun

2. Select the stages in a Massive Star's life cycle, and number them to indicate their order. Some of the descriptions below do not apply.

   6 NeutronStar/Black Hole/ Recycling
   2 Protostar
   1 Nebula
   ~~White Dwarf~~
   4 Red Supergiant
   3 Main Sequence Star
   5 Supernova
   ~~Red Giant~~
   ~~Black Dwarf~~

3. Draw two cross-section diagrams showing the layers of a red giant and a red supergiant. Label the material in the innermost layer and the two outermost layers in which fusion is happening. The number of layers in your red supergiant does not have to be exactly correct.



4. Name an element that can only be created by a supernova.

   ~~Iron~~ Gold

5. a. When a massive star runs out of nuclear fuel that it can fuse, the outer layers of the star begin to move. Describe the **direction** and **speed** of the star's outer layers just after fusion stops in the star.

In (toward core) Fast



b. After a while, the speed and the direction of the outermost star layers changes. Explain why they change.

They slam into the core (and bounce back)

c. Describe the **speed** and **direction** of the star's outermost layers after the change referred to in part b.

Very, Very Fast Out (from core)

d. Why is the speed in part C very different from the speed in part A? Use the momentum formula to help illustrate your answer.

momentum $p = mv$

mass velocity

$p = mv$

Since the bouncing material has a small mass, it has a high velocity

6. Explain why humans wouldn't exist if there had not been a supernova

The stuff we're made of would still be in the center of a star.

7. After a supernova, some of the star's core remains. What does the core become, and what are the required conditions for each possibility:

The core becomes a black hole if has more than 3 solar masses

The core becomes a neutron star if has less than 3 solar masses

Bonus: List all three of the interesting Neutron Star facts from the class notes.