ESS 100 (Stapleton) Name: _____

Notes: Life Cycle of our Sun (and other medium sized stars)

1. What process gives our Sun its energy?

2. What is the Sun's main fuel?

3. What is produced inside the Sun when this fuel is fused together?

4. What are the stages of our Sun's life (in order)?

5. What is a "main sequence" star?

6. What color is our Sun, and what does that tell us about our Sun's temperature and mass? Explain your reasoning.

7. Right now, our Sun is a main sequence star. What will happen to end this stage of our Sun's life?

8. Draw a cross-section diagrams of our Sun at the beginning and the end of main sequence stage of life. Label the materials in the Sun, and explain why they are there.

What will hapen when our Sun leaves the *main sequence* is complicated! Let's go over the details...

9. Remember that, as fusion happens in the Sun's core, _____ hydrogen atoms fuse together to make _____ helium atom. So as the hydrogen in the Sun's core fuses to become helium, there will be _____ (more or fewer) particles in the core. This means the helium in the core will take up _____ (less or more) space than the hydrogen did.
This _____ (shrinking or growing) of the material in the core will cause the star's core to _____ (compress or expand),
and that will cause the core to _____ (cool down or heat up).

   This event, just after core hydrogen fusion shuts off, is called _____.

10. Core contraction heats up a shell of hydrogen around the star's core so much that:

    _____

    Compared to the heat of core hydrogen fusion, this shell fusion is _____.

11. The intense fusion happening in the shell around the Sun's core will heat up the outer layers of the sun, causing them to _____ (compress together or expand outward). This _____ will cause the temperature of those outer layers to _____ (increase or decrease). The color of the Sun will change to _____ (a cooler color), and it will be known as a _____.

12. While the outside of a red giant is red, if you could see the part of the star closer to the core, it would be _____.

Let's Summarize the Red Giant Phase So Far…

13. After it leaves its "main sequence" phase, our Sun will become a _____. In this stage, what will happen to Our Sun's size? Explain why.

14. When our Sun becomes a red giant, what will happen to its <u>surface</u> temperature? Why?

15. When our Sun becomes a red giant why will it turn red?

16. What is the main source of the Sun's energy during the Red Giant stage?

What else happens in the Red Giant Phase?

17. As fusion continues to happen, the Sun's core continues to _____ (shrink or expand), so its temperature continues to _____ (cool or heat up). Eventually it becomes hot enough for the _____ in the core to fuse into _____ and _____. This produces more energy.

18. Sketch and label a cross-section of the sun during its Red Giant phase.

How does the red Giant Phase End?

19. As fusion continues, particles of light, called _____ travel away from the star. These are the light we see. But photons also have momentum, so they can push things. The starlight created by fusion creates a _____ of photons that slowly push away the star's outer layers. When these outer layers are gone, there is _____ (more or less) pressure pushing on the core, so _____ stops. When this happens, what is left of the star _____ (cools down or heats up). This temperature change causes the star to _____ (compress or expand), which causes the temperature to _____. Since the star got its color from its outer layers, it will no longer be _____. It will be _____, because the remaining inner layers are _____.

Our Sun's Final Stage Summary:

20. As our Sun enters its final stage of life, what will happen to its color and temperature? Explain why.

21. What is the source of the Sun's energy at this stage?

22. What type of star will the Sun be at this point?

23. There are actually a few more stages in our Sun's life. Our Sun will eventually turn into a _____, then a _____, and finally a _____. This will happen because…

24. Our Sun is about _____ old, and it will turn into a red giant in about _____ from today.