Year 12 Science: Stars: fusion, the HR diagram and life cycles

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. What stops a main sequence star from collapsing under gravity?

2. Where on the HR diagram are white dwarfs, and why are they dim?

3. If a star were moved to 3 times its distance from us, what fraction of its brightness would we see?

4. What does a star of 30 Sun masses become at the end of its life?

5. How far is 4.24 light-years in km, using 1 light-year = 9.5×10^{12} km?

Exam-style question: two stars near the Southern Cross

Alpha Centauri A is a yellow, Sun-like main sequence star 4.37 light-years away. Gamma Crucis, at the top of the Southern Cross, is a red giant much further away, yet both are easy to see.

6. Compare the colour, surface temperature and position on the HR diagram of the two stars.

7. Explain how Gamma Crucis can be cooler than Alpha Centauri A but far more luminous.

8. Explain how a Sun-like star changes from the main sequence into a red giant, referring to gravity, fuel use and energy.

9. Explain why a star of 15 Sun masses ends very differently from Alpha Centauri A.

Fix the mistake

10. Correct this statement: "A red star is cool, so it must be dim and low on the HR diagram."

11. Correct this statement: "Massive stars live longest because they have the most fuel."

12. Correct this statement: "The Sun will explode as a supernova."

13. Correct this statement: "The temperature axis on an HR diagram increases to the right."